Appendix U

Preliminary Geotechnical Investigation of Proposed WWTP Site

Preliminary Geotechnical Services

for

Marion Waste Water Treatment Plant

Marion, Kentucky

March 8, 2017

Prepared for

Eclipse Engineers, PLLC

Somerset, Kentucky

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March 8, 2017

Eclipse Engineers, PLLC
113 W. Mt. Vernon Street
Somerset, KY 42501

Attention: Mr. Alan Robinson, PE
Phone: 606-451-0959
Email: arobinson@eclipseengineers.net

Subject: **Preliminary Geotechnical Investigation**
Marion Waste Water Treatment Plant
Marion, Kentucky
CSI Project No. LV170004

Dear Mr. Robinson:

Consulting Services Incorporated of Kentucky (CSI) is pleased to present our report for the preliminary geotechnical services completed on the subject project. We provided our services in general accordance with the CSI Proposal Number 4835, dated January 23, 2017.

Our report represents information provided to us, readily available published data relevant to the site and site area, our observations and subsurface conditions encountered and our opinion of primary geotechnical conditions (discussion and preliminary recommendations) affecting design, construction and performance of the proposed earth- and/or rock-supported portions of the project.

We appreciate the opportunity to provide our geotechnical services to you and the design team. Please do not hesitate to contact us for questions or comments about the information contained herein.

Cordially,

Yibo Zhang, E.I.T.
Staff Engineer

STATE OF KENTUCKY
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21244
LICENSED PROFESSIONAL ENGINEER

3-8-17

Joseph S. Cooke, P.E.
Principal Engineer
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INTRODUCTION

1 SCOPE OF THE PRELIMINARY GEOTECHNICAL SERVICES

As we proposed, we conducted geotechnical services which are summarized in the following report. Our services included a review of the project information provided, conducting a subsurface exploration that utilized soil borings to obtain samples for modeling the soil/rock conditions at the subject site, a review of the data and information obtained and providing preliminary recommendations for the planning and development of the site as listed in our proposal. We provided an initial findings letter, dated February 27, 2017, summarizing our findings. This report, along with the letter, should be used in tandem for the project.

2 PROVIDED INFORMATION

Project information for this proposal was provided to us via telephone conversations with you. No project related documents were provided for the preparation of this report. CSI performed a site visit on February 8, 2016. A desktop review was also provided on February 10, 2016. The letter contained our site observations and available data related to the site including site soil information and historical aerial photos.

Based on the supplied information, we understand that the project is currently in the preliminary site development phase. Thus, only preliminary geotechnical information has been provided at this time.

- The project site is located northwest of Highway US 60, on the west side of Pippi Hardin Boulevard in Marion, KY.
- The site was previously developed, and the structures were demolished in the 2000's.
- The proposed construction is for a waste water treatment plant, with necessary appurtenances and parking lots.
- Due to the preliminary nature of this report, no structural or pavement loading information has been provided to CSI at this time.

If any of the aforementioned information is in error or if the information changes during any time of the project, please contact our office so we can evaluate the new information with respect to our findings and preliminary recommendations.

3 AREA/SITE INFORMATION

3A AREA TOPOGRAPHY/PHYSIOGRAPHY

The site is located on the western part of the Pennyrile physiographic region of Kentucky. The region is characterized by thousands of springs, sinkholes, and underground caverns and streams. A line of hills formed by isolated Pennsylvanian- and Mississippian-age sandstones capping more erodable Mississippian-age shales and limestones occurs in the western part of Pennyrile region. Also, complexly faulted strata occur in Crittenden County.

Published topographic mapping by the USGS (United States Geologic Survey) indicates the elevations in the project site vicinity range from approximately 540 feet to 620 feet. Figure 1 shows the location of the site with respect to the regional physiography.

Figure 1. Kentucky Physiographic Map
(site vicinity shown in the circle)

3B SITE GEOLOGY

A review of the USGS Marion Geologic Quadrangle Map, Crittenden and Caldwell Counties, Kentucky (dated 1966) indicates the project site is underlain by Tar Springs Sandstone Formation of Mississippian aged rock deposits.

As mapped, the Tar Springs Sandstone consists of sandstone and shale in two layers. In the upper layer, the sandstone is light gray and fine-grained, the shale is medium to dark gray, silty, and interbedded in sandstone. In the bottom layer, the sandstone is light gray, fine to very fine grained, and grades vertically into a few thinly interbedded silty shale.

It should be noted that the subsurface conditions encountered during drilling operations and site observations were generally consistent with the data presented on the geologic quadrangle including rock conditions and variable depth to bedrock. However, the geologic quadrangle map indicated the sandstone in this area was light to dark gray, but the rock core sample indicated the sandstone was reddish brown.

Additional items pertaining to the site geology include the following:

- Moore Hill Fault System is mapped approximately half of a mile north of the project site; Claylick Fault System is mapped approximately one mile south of the project site; Chapel Hill Fault is mapped approximately three miles south of the project site. The geologic dip in the area of the project site is approximately five percent to the southeast.

Figure 2 shows the location of the site with respect to the area geology.

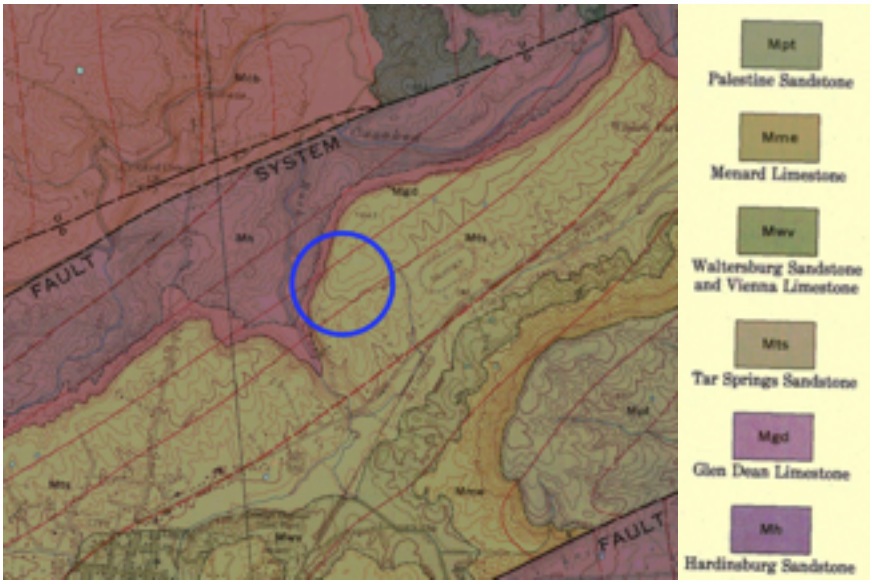


Figure 2. Site Geology (USGS Marion Geologic Quadrangle, dated 1966) (site vicinity shown in circle)

3C PUBLISHED SITE SOIL CONDITIONS

According to the USDA Soil Survey of Kentucky, the soils underlying the site vicinity consist of the following series as shown in Table 1:

Table 1. USDA Soil Survey

Soil Series	Abbreviation	Slope (%)	Depth to Restrictive Feature	Depth to Water Table	Notes
Lenberg-Frondorf silt loams	LfE	20 to 50	20 to 40 inches to lithic bedrock	more than 80 inches	extremely bouldery
Hosmer silt loam	uHosB	2 to 6	20 to 39 inches to fragipan	about 20 to 30 inches	-
Zanesville silt loam	ZaC2	6 to 12	22 to 30 inches to fragipan; 40 to 79 inches to lithic bedrock	about 19 to 28 inches	eroded

- These soil series are generally listed as well drained to moderately well drained
- These soils are listed as high risk of corrosion of steel and concrete
- These soil series are listed as very limited to somewhat limited with respect to site development and construction, including dwellings (with or without basements), local roads and streets, shallow excavations, and small commercial buildings
- Particular issues affecting site development and construction include depth to saturated zone, depth to thin cemented pan, low strength, and frost action

The issues mentioned that are pertinent to development considerations of site and project will be addressed in the latter sections of this report.

Figure 3 is the soils map from the USDA website.

Figure 3. USDA Soil Survey Map of Project Site

3D OTHER PUBLISHED SITE INFORMATION

We have reviewed several available aerial photographs, dated as far back as November 1998. The project site is located northwest of Highway US 60, on the west side of Pippi Hardin Boulevard in Marion, KY. The followings are our observations of historic aerial photos:

Figure 4. Aerial photo of the site area, dated November 20, 1998 (Google Earth Image)

Figure 5. Aerial photo of the site area, dated June 14, 2006 (Google Earth Image)

Figure 6. Aerial photo of the site area, dated November 6, 2013 (Google Earth Image)

Figure 7. Aerial photo of the site area, dated October 15, 2015 (Google Earth Image)

- The project site was occupied by eight rows of structures, which were assumed to be used as poultry operation structures, and the structures were demolished between June 2004 and June 2006.
- The project site was regraded between May 2011 and November 2013.
- Pippi Hardin Boulevard was built along the east edge of the project site between November 2013 and October 2015.
- Please reference the aerial photographs above for further details.

FINDINGS

4 SITE SURFACE OBSERVATIONS

A site reconnaissance was conducted by Mr. Yibo Zhang, EIT, of CSI on February 22, 2017. Mr. Zhang observed and documented site surface conditions, logged soil borings and rock cores, and directed drilling operations.

The project site is located northwest of Highway US 60, on the west side of Pippi Hardin Boulevard. The site is primarily grassy and vacant at the time of exploration. The project site is generally bounded by Pippi Hardin Boulevard to the east and a tree line to the north and west. A creek runs from south to north approximately 200 feet away from the western edge of the project site.

At the time of our site visit, the ground cover consisted primarily of ankle-high grass and mature bushes. Concrete blocks, plastic sewer pipes, cables, and abandoned gas poles were observed across the site. Along the west side of Pippi Hardin Boulevard, signs of utility construction were observed.

In general, the site is relatively level. The topography peaks at northeast area and slopes gently downward to the southwest. According to our top of boring elevations, there is a difference of elevation of less than nine feet at the boring locations. The site was easily navigated by the ATV drill

rig, but the top soil in some areas was soft. The support truck mired in the soft soils requiring the ATV drill rig to pull the truck during drilling operations. No standing water was observed at the time of our site visit.

Underground utilities were marked along eastern and southern edges of the project site. The photos below show the site conditions at the time of our visit.

5 SUBSURFACE CONDITIONS

We utilized four soil test borings to explore the subsurface conditions at the site. Soil borings were performed in a general "grid" pattern across the site in an effort to provide representative information with respect to the subsurface conditions. Two of our soil borings were performed in the northeast and southwest areas, while the remaining two were performed in middle of the site. In general, we encountered topsoil, overlying natural soils, overlying highly weathered sandstone or shale. Please note that possible old fill materials were encountered at boring B-102. The following table summarizes the general depths of our borings.

Table 2. Boring Information Summary

Boring Number	Total Depth (ft)*	Depth to Auger Refusal (AR) (ft)*
B-101	21	21
B-102	21	Not encountered
B-103	13	13
B-104	11	11

*Depths rounded to the nearest whole foot.

5A STRATA INFORMATION

The subsurface conditions encountered at the boring locations are shown on the Test Boring Records in Appendix A. These Test Boring Records represent our interpretation of the subsurface conditions based on the field logs, visual examination of field samples by an engineer, and tests of the samples collected. The letters in parentheses following the soil descriptions are the soil classifications in accordance with the Unified Soil Classification System. It should be noted that the stratification lines shown on the soil boring logs represent approximate transitions between material types. In-situ stratum changes could occur gradually or at slightly different depths.

Photo 1. View of the site facing south from the center of north perimeter of the site

Photo 2. View of the site facing west from the center of east perimeter of the site

Photo 3. View of the creek facing west from the center of west perimeter of the site

Photo 4. View of observed plastic sewer pipes and cables

Photo 5. Panoramic view of the site facing southeast from the northwest corner

The general subsurface conditions are summarized in the following table:

Table 3. General Subsurface Strata

Strata	Thickness	Notes
Surface Cover: Topsoil	4 to 7 inches	Present in all borings
Possible Old Fill: firm brown and gray clay with sand, and possible buried topsoil which was soft to firm greenish gray soil with organic debris	7 feet	Present in B-102
Natural: Alluvial and residual soils, Lean Clay (CL), brown and gray, firm to stiff, moist	2 to 15 feet	Present in all borings
Highly Weathered Sandstone: reddish brown to pink-red sandstone	4 to 11 feet	Present in borings B-101, B-103, and B-104
Highly Weathered Rock Shale: dark gray, brittle or soil-like	3 feet	Present in boring B-102

Auger refusal was encountered at three of our soil borings. Auger refusal depths ranged from approximately eleven to twenty-one feet. We have interpreted auger refusal to be the top of bedrock. Refusal material was sampled by coring rock at boring B-103. The rock core is summarized below.

Boring	Run	Description and Notes	Photo of Core
B-103	from 13.4 feet to 18.4 feet deep	Highly weathered shale with two inches of sandstone cap on top and multiple sandstone seams at upper two feet, no core water loss observed Sandstone - reddish brown, medium to coarsely crystalline, hard Shale - gray to dark gray, highly weathered and sometimes soil-like, brittle with little moisture and soft with higher moisture Recovery: 100% RQD: 79% (good engineering quality)	

Table 4. Rock Core Summary
(Top of rock core shown in picture is at the upper right corner of the photo)

For details of subsurface conditions encountered at a particular boring location please refer to the boring logs contained in Appendix A. It should be noted that our borings were drilled and sampled according to the procedures presented in the appendix. The top of boring elevations were referenced to the top of a gas meter at southeast corner of the site, using a rod and level. The TBM elevation was assumed to be 100.00 feet. The boring locations shown in the appendix should be considered accurate only to the degree implied by the method used.

5B GROUNDWATER CONDITIONS

Free water was not observed in any of our soil boring at the completion of augering. Groundwater level readings were not taken in borings B-103 (where rock coring was performed) since water was used to cool the rock coring bit. Please note that the core holes were dry at coring location upon completion of soil augering. Due to safety concerns, the borings were immediately filled upon their completion with auger cuttings and by reversing auger the top few feet to create a temporary plug (i.e. - temporarily providing a safe walking surface). Please be aware that these hole plugs may experience some settlement over time, thus they should be monitored and backfilled to grade as necessary. In this part of Kentucky, water conditions that usually affect construction and performance of projects consist of trapped/perched water zones which occur in variable areas in the soil mass, at or near existing or former structures, at or near the bedrock bedding planes, or at or near the soil/rock interface. Perched water sources are often not linked to the more continuous relatively stable ground water table that typically occurs at greater depths. Finally, water issues are also dependent upon recent rainfall activity and surface and subsurface drainage patterns in the area.

6 LABORATORY TESTING

Laboratory tests were performed on selected recovered samples from our borings. Detailed descriptions of these tests and the results of our testing are included in the appendix. Tests performed included:

- 10 natural moisture content tests
- 2 Atterberg limits tests
- 2 Percent Finer than #200 Sieve tests
- 1 Unconfined Compression test (rock)

GEOTECHNICAL DISCUSSION AND PRELIMINARY RECOMMENDATIONS

7 DISCUSSION-GEOTECHNICAL ISSUES

The following list of geotechnical concerns does not mean that the site is "unsuitable" or has an abnormal risk due to soil/geological conditions. It is meant to serve as a list of items that will require planning and budgeting to address the issues. The site conditions and risks are normal for the site area.

- **Previous Site Construction**
- **Previously Placed (Old) Fill**
- **Depth to Bedrock**
- **Sandy Soils**
- **Site Clearing**
- **Agricultural Land/Soft Soil Conditions**

The following sections discuss each issue. However, preliminary recommendations to address the issues are contained in later sections of the report.

7A PREVIOUS SITE CONSTRUCTION

Review of available historical aerial photos indicates that the site was used as poultry operation with eight rows of housing structures, and they were demolished between June 2004 and June 2006. Also, signs of utility construction were observed along the west side of Pippi Hardin Boulevard; utility was located along the east and south edges of the project site. Expect that old fill or other deleterious material will be encountered in the area of the existing structures. This could include household refuse, root material, old foundations, wells, cisterns, septic tanks/fields, or other underground structures. At the time of our exploration, concrete blocks, plastic sewer pipes, cables, and abandoned gas pole were observed across the site. Your project budget should include a contingency for the removal and remediation of any encountered underground structures.

7B PREVIOUSLY PLACED (OLD) FILL

Possible previously placed fill was encountered in one of our borings (B-102). The soils at boring B-102 consisted of firm brown and gray soils with sand, and possible buried top soil which was soft to firm, greenish gray soil with organic debris including grass and fine roots. The encountered possible old fill was approximately seven feet in thickness. We have been provided with no documentation of the degree of compaction of fill following the demolishment of previously existing structures. Our boring data indicates the brown and gray soils likely consist of lean clay with sand. Fills placed in an uncontrolled manner such as this site have proven to be problematic. The problems generally arise not from general settlement, but from erratic differential settling of the fill. The settlement of large masses is dependent upon several factors such as fill thickness, degree of compaction, fill contents, and age of the fill mass. Also, fills tend to settle linearly with thickness. It should be noted that no previously placed fill was encountered in the remaining three soil borings.

It is possible that some pockets of old fill will be uncovered during earthwork operations. Any encountered old fill will require removal from the area if it is encountered in the area of new structures or pavements. Foundations must not bear on the old fill material. Floor slabs and pavements may bear on the old fill if the materials are deemed stable under a proofroll observed by CSI at the time of construction.

7C DEPTH TO BEDROCK

Three of our soil borings (B101, B-103, and B104) encountered bedrock at depths ranging from eleven to twenty-one feet. The site is located on a gently sloping hillside with at least eight feet of vertical relief between the northeast and southwest areas of the project site. Since underground structures are expected for the proposed development, any cuts close to these amounts will likely encounter rock. Selection of final grades will have a significant impact on the construction budget since rock removal is expensive. Mass earthwork cuts, foundation excavations and deep excavations (such as sanitary sewer, storm sewer, water lines, etc.) could intersect the soil/rock interface. Additionally, in select areas, rock excavation may be required for plumbing, electrical, and other utility installation. The encountered underlying bedrock appeared to consist of sandstone and weathered shale, thus rock removal (i.e. – blasting, hoe-ramming, etc.) should be expected for this project.

7D SANDY SOILS

Our laboratory testing indicates soils with sand, are present on this project site. This is consistent with the soil survey, geology, and our experience in the area. Two Atterberg limits tests were performed on soil samples from the borings. One of these samples classified as lean clay (CL) with sand. Our borings also encountered sandy soils at the site. Sandy soils will not remain stable and will slough/slump in excavations. Also, sandy soils will not remain stable when left exposed to weathering conditions (i.e., if left open in foundation or other excavations).

Recommendations for slope construction was beyond our scope of services, but sandy soils typically will not remain stable (even in temporary slopes) steeper than about 2H:1V (horizontal to vertical). Also, sandy soils tend to hold/have water pockets when surrounded by more clayey soils.

7E SITE CLEARING

The project site is covered primarily with ankle-high grass and mature bushes. Large diameter roots (greater than 1/2 inch in diameter) will require removal during clearing and grubbing operations. In some instances, these root masses could extend into the shallow bedrock. The voids left when the root masses are removed will need to be properly backfilled.

7F AGRICULTURAL LAND/SOFT SOIL CONDITIONS

Due to the purpose of previous existed structures on site, the upper one to two feet of soil may be soft, loose, and/or wet with excessive organic debris. The greenish gray soil encountered at boring B-102 was an indication of such material. These soils will provide inconsistent foundation support. These soils have the potential to compress if they are within the zone of influence of the project foundations, possibly causing differential settlement.

8 PRELIMINARY RECOMMENDATIONS

These initial observations should be used for informational purposes only and should not be considered as recommendations for construction on this project. As previously stated, formal recommendations cannot be provided unless a full geotechnical exploration is performed.

8A EARTHWORK

The soils encountered onsite would likely be considered suitable for use in mass grading, for use as structural fill, and for use as backfill. Sandy clays, if encountered during earthwork activities, would require special considerations if used for the aforementioned applications. Moisture and method of compaction would need to be considered when using silty, sandy soils borrowed from other sites.

8B FOUNDATION DESIGN AND SEISMIC DESIGN

Based on the nature of the anticipated structures, we anticipate shallow foundations (continuous or isolated) would be suitable for this development. Shallow spread footings on soil would be suitable for buildings, and spread footings on rock (depending on depth) would be suitable for underground structures. The foundations of the proposed structures should bear either completely on soil -OR- completely on the rock, not combinations of both. CSI should be provided with an anticipated grading plan before the final geotechnical investigation to verify the types of foundations. Shallow foundations bearing on soil should expect an maximum allowable bearing capacity range of 2,000 ~ 3,000 pounds per square foot (PSF), and shallow foundations bearing on rock should expect an maximum allowable bearing capacity range of 10,000 ~ 20,000 pounds per square foot (PSF). Deeper excavations (below 4 to 5 feet) would require planning and budgeting for sandy soil (sloughing) and possible wet conditions. Additionally, a site seismic classification of “D” will likely be assigned for this project.

8C GRADE SUPPORTED FLOOR SLABS

Conventional concrete slab-on-grade floors are likely suitable for this site provided the concrete slabs bear completely on soil.

8D PAVEMENTS

Normal pavement thickness (compared to the area) should be expected for the project. Adequate soil/ subgrade support is critical for any pavement area. Prior to stone base placement we recommend an additional proofroll of the subgrade should be performed to verify subgrade conditions, especially if any old fill is to be left in-place in pavement areas. Recommendations for undercutting/repair of the subgrade can be made at that time by a CSI geotechnical engineer.

8E ADDITIONAL WORK

This geotechnical exploration was preliminary in nature. Therefore, formal recommendations cannot be provided unless a full geotechnical exploration is performed which will likely include additional soil borings and/or test pits. We expect that the final geotechnical exploration would also include additional laboratory testing (likely including additional soil classification tests, standard Proctor test(s), California Bearing Ratio (CBR) test(s), consolidation test (if necessary), and swell test(s) (if necessary)).

9 NOTES ON THE REPORT AND PRELIMINARY RECOMMENDATIONS

We recommend that this complete report be provided to the various design team members, the contractors and the project Owner. A preliminary geotechnical exploration, such as the one we performed, uses widely spaced borings to attempt to model the subsurface conditions at the site. Because no exploration contains complete data or a complete model, there is always a possibility that conditions between borings will be different from those at specific boring locations. Thus, it is possible that some subsurface conditions will not be as anticipated by the project team or contractor. If this report is included or referenced in the

actual contract documents, **it shall be explicitly understood that this report is for informational purposes only**. CSI shall not be responsible for the opinions of, or conclusions drawn by, others.

It has been our experience that the construction process often disturbs soil conditions and this process, no matter how much experience we use to anticipate construction methodology, is not completely predictable. Therefore, changes or modifications to our preliminary recommendations are likely needed due to these possible variances. Experienced CSI geotechnical personnel should be used to observe and document the construction procedures and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations to solve the problems created. We recommend that the Owner retain CSI to provide this service based upon our familiarity with the project, the subsurface conditions and the intent of our preliminary recommendations.

This report is based on the supplied project information, the subsurface conditions observed at the time of the report, and our experience with similar conditions. As such, it cannot be applied to other project sites, types, or combinations thereof. If the Project Information section in this report contains incorrect information or if additional information is available, you should convey the correct or additional information to us and retain us to review our preliminary recommendations. Our preliminary recommendations may then require modification.

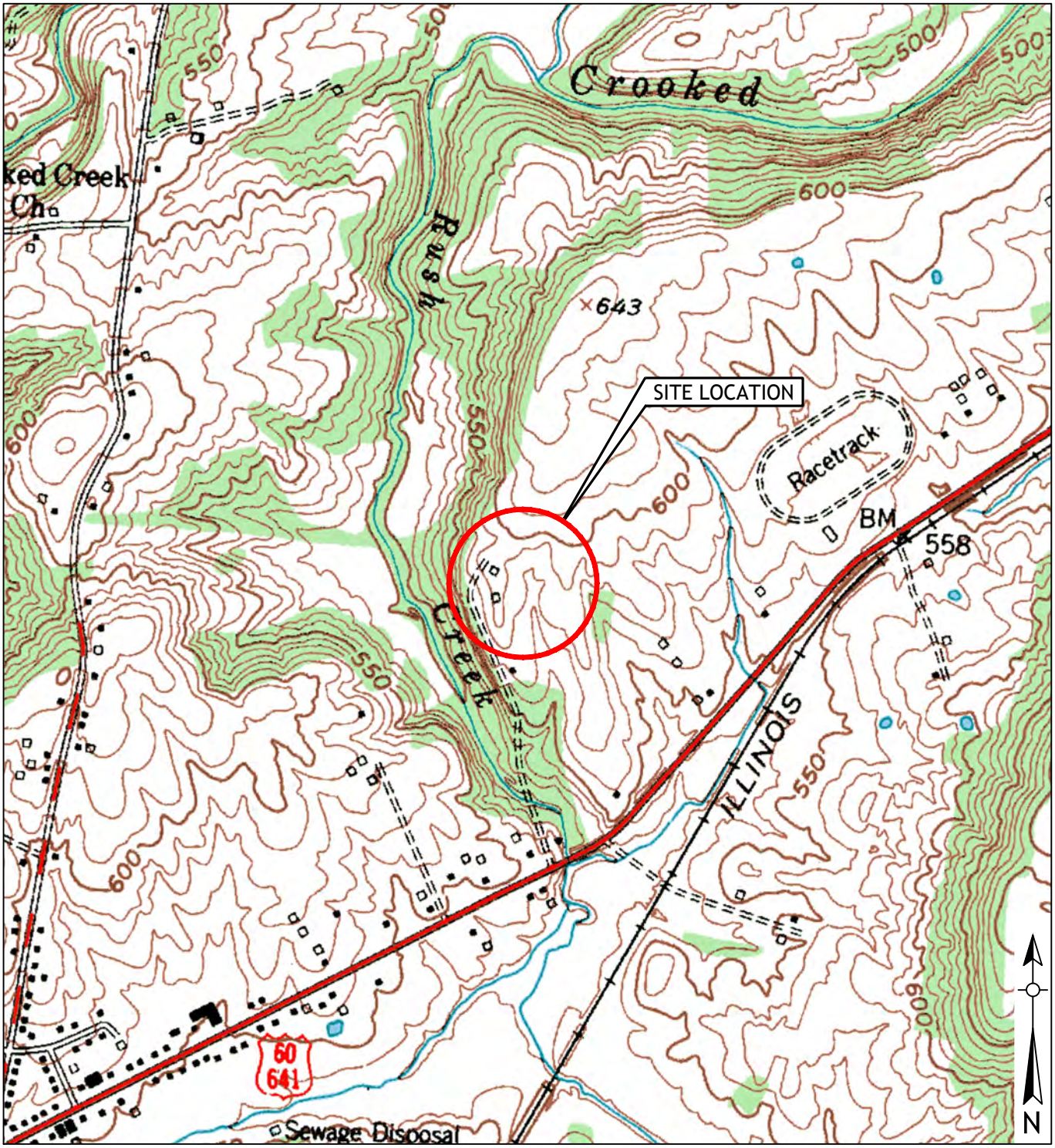
No section or portion of this report (including Appendix information) can be used as a stand alone article to make distinct changes or assumptions. The entire report and Appendix should be used together as one resource. We wish to remind you that our exploration services include storing the soil samples collected and making them available for inspection for 30 days. The soil samples are then discarded unless you request otherwise. Please inform us if you wish to keep any of the obtained samples.

While this report deals with samples of subsurface materials and some comments on water conditions at the site, **no assessment of site environmental conditions or the presence of contaminants were performed**.

We wish to remind you that our exploration services include storing the soil samples collected and making them available for inspection for 30 days. The samples are then discarded unless you request otherwise. Please inform us if you wish to keep any of the obtained samples.

APPENDIX

Site Location Plan
Boring Location Plan
Key to Symbols and Descriptions
Test Boring Records
Field Testing Procedures
Summary of Lab Testing Table(s) and Lab Testing Sheets
Laboratory Testing Procedures



Site Location Plan adapted from USGS Marion Topographic Quadrangle map dated 1954, with further adaptation by CSI personnel.

FOR ILLUSTRATION PURPOSES ONLY

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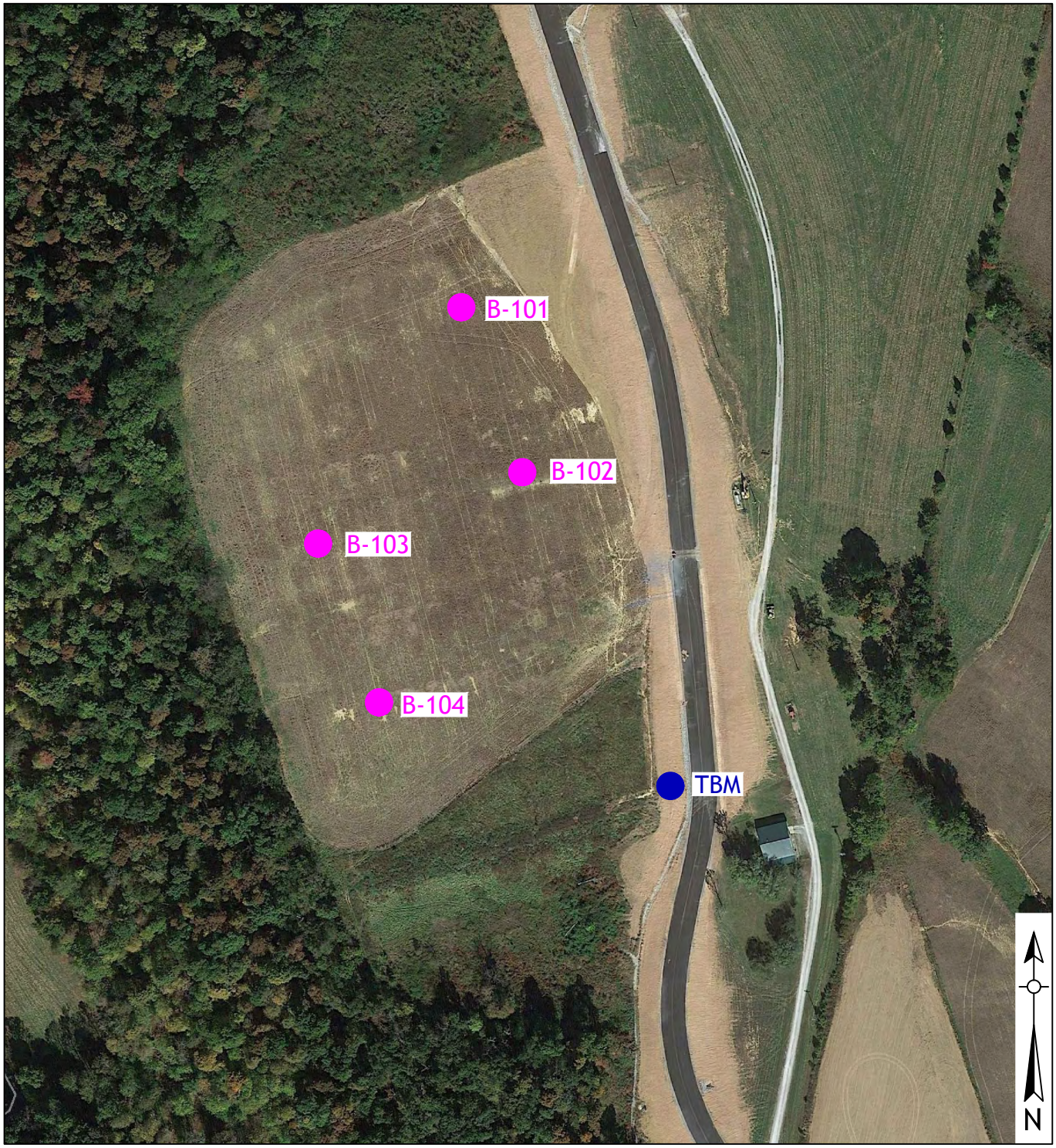
TITLE: SITE LOCATION PLAN	Project No: LV170004	Drawn By: JB
PROJECT: MARION WASTE WATER TREATMENT PLANT MARION, KENTUCKY	Date: March 8, 2017	Checked By: YZ
	Scale: Not To Scale	Drawing No: 1 of 1



Boring Location Plan adapted from Aerial Imagery, with further adaptation by CSI personnel.
Elevations were referenced to the top of a gas meter (assumed to be 100.0 feet).

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LEGEND	
B-XXX	BORING LOCATIONS
TBM	TEMPORARY BENCHMARK

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TITLE: BORING LOCATION PLAN		Project No: LV170004	Drawn By: JB
PROJECT: MARION WASTE WATER TREATMENT PLANT MARION, KENTUCKY		Date: March 8, 2017	Checked By: YZ
		Scale: Not To Scale	Drawing No: 1 of 1

Consulting Services Incorporated

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Geotechnical Boring Information Sheet

Sample Type Symbols

Splitspoon (SPT)

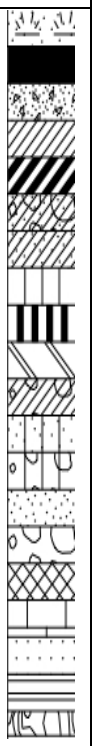
Shelby Tube

Grab

Rock Core

Auger Cuttings

Surface Symbols



Topsoil

Asphalt

Concrete

Lean Clay

Fat Clay

Glacial Till

Sandy Clay

Silt

Elastic Silt

Lean Clay to Fat Clay

Gravelly Clay

Sandy Silt

Gravelly Silt

Sand

Gravel

Fill

Limestone

Sandstone

Shale/Siltstone

Weathered Rock

Samples Strength Descriptors

Cohesive Soils:	**N**
Very Soft	0-1
Soft	2-4
Firm	5-8
Stiff	9-15
Very Stiff	16-30
Hard	31+
Non-cohesive Soils:	
Very Loose	0-4
Loose	5-10
Firm	11-20
Very Firm	21-30
Dense	30-50
Very Dense	51+

Definitions

SPT-"Splitspoon" or standard penetration test. Blow counts are number of drops required for a 140 lb hammer dropping 30 inches to drive the sampler 6 inches.

N-value is the addition of the last two intervals of the 18-inch sample.

Shelby tubes are often called "undisturbed samples". They are directly pushed into the ground, twisted, allowed to rest for a small period of time and then pulled out of the ground. Tops and bottoms are cleaned and then sealed.

Sample classification is done in general accordance with ASTM D2487 and 2488 using the Unified Soil Classification System (USCS) as a general guide.

Soil moisture descriptions are based on the recovered sample observations. The descriptors are dry, slightly moist, moist, very moist and wet. These are typically based on relative estimates of the moisture condition of a visual estimation of the soils optimum moisture content (EOMC). Dry is almost in a "dusty" condition usually 6 or more percent below EOMC. Slightly moist is from about 6 to 2 percent below EOMC at a point at which the soil color does not readily change with the addition of water. Moist is usually 2 percent below to 2 percent above EOMC and the point at which the soil will tend to begin forming "balls" under some pressure in the hand. Very moist is usually from about 2 percent to 6 percent above EOMC and also the point at which it's often considered "muddy". Wet soil is usually 6 or more percent above EOMC and often contains free water or the soil is in a saturated state.

Silt or Clay is defined at material finer than a standard #200 US sieve (<0.075mm) Sand is defined as material between the size of #200 sieve up to #4 sieve. Gravel is from #4 size sieve material to 3". Cobbles are from 3" to 12". Boulders are over 12".

Rock hardness is classified as follows:

Very Soft:	Easily broken by hand pressure
Soft:	Ends can be broken by hand pressure; easily broken with hammer
Medium:	Ends easily broken with hammer; middle requires moderate blow
Hard:	Ends require moderate hammer blow; middle requires several blows
Very Hard:	Many blows with a hammer required to break core

Rock Quality Designation (RQD) is defined as total combined length of 4" or longer pieces of core divided by the total core run length; defined in percentage.

Water or cave-in observed in borings is at completion of drilling each boring unless otherwise noted.

Strata lengths shown on borings represents a rough estimate. Transition may be more abrupt or gradual. Soil borings are representative of that estimated location at that time and are based on recovered samples. Conditions may be different between borings and between sample intervals. Boring information is not to be considered stand alone but should be taken in context with comments and information in the geotechnical report and the means by which the borings are logged, sampled and drilled.

BORING LOG

BORING: **B-101**

Consulting Services Incorporated
11012 Decimal Drive
Louisville, Kentucky 40299
Phone: 502.532.8267
Fax: 888.792.3121

Project Number: LV170004	Weather: Cloudy, 50's	Contractor: CSI Drilling
Name: Marion Waste Water Treatment Plant	Elevation (ft): 110.6	Drill Rig: CME 550
Client: Eclipse Engineers, PLLC	Date Started: 2/22/17	Method: SFA
Location: Marion, Kentucky	Date Completed: 2/22/17	Hole Size (in): 4
Logged By: Y. Zhang, EIT	Checked By: A. Nelson	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
110	0		TOPSOIL - 4 inches	2-3-5 (8)	16		Dry upon completion of soil augering
			LEAN CLAY with Sand (CL) - FIRM to VERY STIFF, brown and gray, with black mottling, moist				
108	2			6-9-10 (19)	18		
106	4	CL		8-9-10 (19)	18		
104	6			5-7-10 (17)	18		
102	8						
100	10		LEAN CLAY (CL) - VERY STIFF, brown and gray, with black mottling, with reddish-brown rock fragments, moist	8-9-9 (18)	18		
98	12	CL					
96	14			4-11-50/2"	14		
94	16		SANDSTONE - reddish-brown, severely weathered, dry				
92	18			50/1"	0		
90	20		Auger Refusal at 20.6 feet				
88	22						
86	24						
84	26						
82	28						
80	30						

*Elevations were referenced to the top of a gas meter (assumed to be 100.0 feet).

Left Photo: Photo of Approximate Boring Location
Right Photo: Photo of Boring

BORING LOG

BORING: **B-102**

Consulting Services Incorporated
11012 Decimal Drive
Louisville, Kentucky 40299
Phone: 502.532.8267
Fax: 888.792.3121

Project Number: LV170004	Weather: Cloudy, 50's	Contractor: CSI Drilling
Name: Marion Waste Water Treatment Plant	Elevation (ft): 105.2	Drill Rig: CME 550
Client: Eclipse Engineers, PLLC	Date Started: 2/22/17	Method: SFA
Location: Marion, Kentucky	Date Completed: 2/22/17	Hole Size (in): 4
Logged By: Y. Zhang, EIT	Checked By: A. Nelson	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
104	0		TOPSOIL - 4 inches	3-5-4 (9)	18		Dry upon completion of soil augering
	2		Possible FILL - sampled as STIFF, brown and gray clay, moist	4-6-5 (11)	10		
102	4		FILL - sampled as FIRM, greenish-gray clay, with buried topsoil, with organic debris (grass and fine roots), moist	3-4-4 (8)	18		
100	6						
98	8	CL	LEAN CLAY (CL) - FIRM to STIFF, brown and gray, moist	2-3-5 (8)	18		
96	10	CL		3-5-6 (11)	18		
94	12	CL					
92	14	CL		4-7-9 (16)	18		
90	16	CL	LEAN CLAY (CL) - STIFF to VERY STIFF, brown and gray, with reddish-brown rock fragments, moist				
88	18		SHALE - dark gray, highly weathered				
86	20			10-14-15 (29)	18		
84	22		Boring Terminated at 20.5 feet				
82	24						
80	26						
78	28						
76	30						
74							

*Elevations were referenced to the top of a gas meter (assumed to be 100.0 feet).

Left Photo: Photo of Approximate Boring Location
Right Photo: Photo of Boring

BORING LOG

BORING: **B-103**

Consulting Services Incorporated
11012 Decimal Drive
Louisville, Kentucky 40299
Phone: 502.532.8267
Fax: 888.792.3121

Project Number: LV170004	Weather: Cloudy, 60's	Contractor: CSI Drilling
Name: Marion Waste Water Treatment Plant	Elevation (ft): 104.3	Drill Rig: CME 550
Client: Eclipse Engineers, PLLC	Date Started: 2/22/17	Method: SFA
Location: Marion, Kentucky	Date Completed: 2/22/17	Hole Size (in): 4
Logged By: Y. Zhang, EIT	Checked By: A. Nelson	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
104	0		TOPSOIL - 6 inches	1-3-5 (8)	18		Dry upon completion of soil augering
102	2	CL	LEAN CLAY (CL) - FIRM to VERY STIFF, brown and gray, moist	7-8-16 (24)	14		
100	4		SANDSTONE - reddish-brown to pinkish-red, highly weathered, with rock fragments from 2.8' - 6.5'	50/3"	3		
98	6			50/1"	1		
96	8			50/0"	0		
94	10						
92	12						
90	14		Auger Refusal at 13.4 feet Begin Coring at 13.4 feet				No core water loss observed REC (%) - 100
88	16		SANDSTONE - HARD, reddish-brown, medium to coarsely crystalline		60		RQD (%) - 79
86	18		SHALE - SOFT, gray to dark gray, highly weathered, with sandstone seams from 13.6' - 15.6'				
84	20		Coring Terminated at 18.4 feet				
82	22						
80	24						
78	26						
76	28						
74	30						

*Elevations were referenced to the top of a gas meter (assumed to be 100.0 feet).

Left Photo: Photo of Approximate Boring Location
Right Photo: Photo of Boring

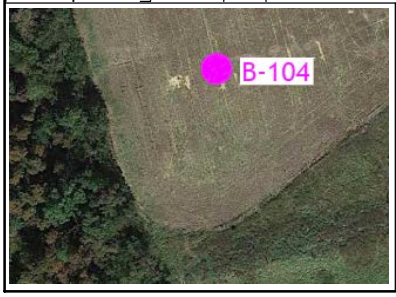
BORING LOG

BORING: **B-104**

Consulting Services Incorporated
11012 Decimal Drive
Louisville, Kentucky 40299
Phone: 502.532.8267
Fax: 888.792.3121

Project Number: LV170004	Weather: Cloudy, 60's	Contractor: CSI Drilling
Name: Marion Waste Water Treatment Plant	Elevation (ft): 102.2	Drill Rig: CME 550
Client: Eclipse Engineers, PLLC	Date Started: 2/22/17	Method: SFA
Location: Marion, Kentucky	Date Completed: 2/22/17	Hole Size (in): 4
Logged By: Y. Zhang, EIT	Checked By: A. Nelson	

Elev. (ft)	Depth (ft)	Symbol	Description	Blow Counts (N Value)	Recov. (in)	Water Level	Remarks
102	0		TOPSOIL - 7 inches	2-1-3 (4)	15		Dry upon completion of soil augering
		CL	LEAN CLAY (CL) - SOFT to VERY STIFF, brown and gray, moist				
100	2			4-8-12 (20)	16		
98	4			7-9-11 (20)	18		
96	6			50/4"	4		
			SANDSTONE - reddish-brown to pinkish-red, highly weathered				
94	8			50/1"	1		
92	10						
			Auger Refusal at 10.9 feet				
90	12						
88	14						
86	16						
84	18						
82	20						
80	22						
78	24						
76	26						
74	28						
72	30						



*Elevations were referenced to the top of a gas meter (assumed to be 100.0 feet).

Left Photo: Photo of Approximate Boring Location
Right Photo: Photo of Boring

FIELD TESTING PROCEDURES

Field Operations: The general field procedures employed by CSI are summarized in ASTM D 420 which is entitled "Investigating and Sampling Soils and Rocks for Engineering Purposes." This recommended practice lists recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical and in situ methods as well as borings.

Borings are drilled to obtain subsurface samples using one of several alternate techniques depending upon the subsurface conditions. These techniques are:

a. Continuous 2-1/2 or 3-1/4 inch I.D. hollow stem augers;

b. Wash borings using roller cone or drag bits (mud or water);

c. Continuous flight augers (ASTM D 1425).

These drilling methods are not capable of penetrating through material designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

The subsurface conditions encountered during drilling are reported on a field test boring record by the chief driller. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer classifies the soils in general accordance with the procedures outlined in ASTM D 2488 and prepares the final boring records, which are the basis for all evaluations and recommendations.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at these boring locations. The lines designating the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report.

The detailed data collection methods using during this study are discussed on the following pages.

Soil Test Borings: Soil test borings were made at the site at locations shown on the attached Boring Plan. Soil sampling and penetration testing were performed in accordance with ASTM D 1586.

The borings were made by mechanically twisting a hollow stem steel auger into the soil. At regular intervals, the drilling tools were removed and soil samples obtained with a standard 1.4 inch I.D., 2 inch O.D., split tube sampler. The sampler was first seated 6 inches to penetrate any loose cuttings, then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded and is designated the "penetration resistance". The penetration resistance, when properly evaluated, is an index to the soil strength and foundation supporting capability.

Representative portions of the soil samples, thus obtained, were placed in glass jars and transported to the laboratory. In the laboratory, the samples were examined to verify the driller's field classifications. Test Boring Records are attached which graphically show the soil descriptions and penetration resistances.

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Core Drilling: Refusal materials are materials that cannot be penetrated with the soil drilling methods employed. Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

Prior to coring, casing is set in the drilled hole through the overburden soils, if necessary, to keep the hole from caving. Refusal materials are then cored according to ASTM D 2113 using a diamond-studded bit fastened to the end of a hollow double tube core barrel. This device is rotated at high speeds, and the cuttings are brought to the surface by circulating water. Core samples of the material penetrated are protected and retained in the swivel-mounted inner tube. Upon completion of each drill run, the core barrel is brought to the surface, the core recovered is measured, the samples are removed and the core is placed in boxes for storage.

The core samples are returned to our laboratory where the refusal material is identified and the percent core recovery and rock quality designation is determined by a soils engineer or geologist. The percent core recovery is the ratio of the sample length obtained to the depth drilled, expressed as a percent. The rock quality designation (RQD) is obtained by summing up the length of core recovered, including only the pieces of core which are four inches or longer, and dividing by the total length drilled. The percent core recovery and RQD are related to soundness and continuity of the refusal material. Refusal material descriptions, recoveries, and RQDs are shown on the "Test Boring Records".

Hand Auger Borings and Dynamic Cone Penetration Testing: Hand auger borings are performed manually by CSI field personnel. This consists of manually twisting hand auger tools into the subsurface and extracting “grab” or baggie samples at intervals determined by the project engineer. At the sample intervals, dynamic cone penetration (DCP) testing is performed. This testing involves the manual raising and dropping of a 20-pound hammer, 18 inches. This “driver” head drives a solid-13/4 inch diameter cone into the ground. DCP “counts” are the number of drops it takes for the hammer to drive three 13/4 inch increments, recorded as X-Y-Z values.

Test Pits: Test pits are excavated by the equipment available, often a backhoe or trackhoe. The dimensions of the test pits are based on the equipment used and the power capacity of the equipment. Samples are taken from the spoils of typical buckets of the excavator and sealed in jars or “Ziploc” baggies. Dynamic Cone Penetration or hand probe testing is often performed in the upper few feet as OSHA standards allow. Refusal is deemed as the lack of advancement of the equipment with reasonable to full machine effort.

Water Level Readings: Water table readings are normally taken in conjunction with borings and are recorded on the "Test Boring Records". These readings indicate the approximate location of the hydrostatic water table at the time of our field investigation. Where impervious soils are encountered (clayey soils) the amount of water seepage into the boring is small, and it is generally not possible to establish the location of the hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

The time of boring water level reported on the boring records is determined by field crews as the drilling tools are advanced. The time of boring water level is detected by changes in the drilling rate, soil samples obtained, etc. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table, which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using an electrical probe to detect the water level surface.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.

Summary of Laboratory Results

Borehole	Depth	Sample Type	Liquid Limit	Plastic Limit	Plasticity Index	Class-ification	Water Content (%)	Unconfined Compressive Strength (tsf)	Dry Density (pcf)	Wet Density (pcf)	Max. Dry Density (pcf)	Opt. Water Content (%)	CBR	Swell (%)	RQD	Percent Recovery	k (cm/sec)	% Finer #200
B-101	0.0	SS					22.8											
B-101	1.5	SS					19.3											
B-101	4.0	SS					19.5											
B-101	6.5	SS	31	15	16	CL	19.5											79.0
B-101	9.0	SS					16.9											
B-101	14.0	SS					19.9											
B-103	13.4	CORE						24										
B-104	0.0	SS					24.5											
B-104	1.5	SS	34	20	14	CL	21.0											91.6
B-104	4.0	SS					18.6											
B-104	6.5	SS					15.4											

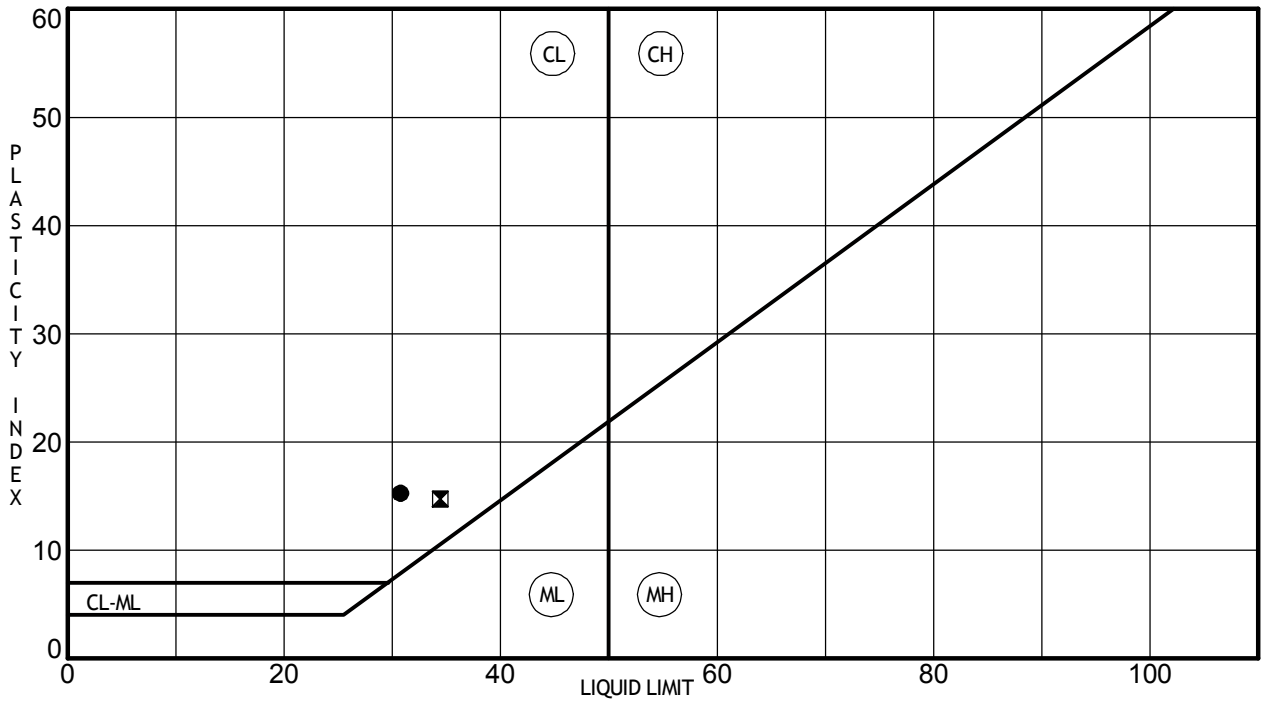
Consulting Services Incorporated
11012 Decimal Drive
Louisville, Kentucky 40299
Phone: 502.532.8269
Fax: 888.792.3121

SS - Split Spoon Sample
GRAB - Bulk Grab Sample
k - Coefficient of Permeability
- See Attached test Results

PROJECT INFORMATION

Client: Eclipse Engineers, PLLC
Project Name: Marion Waste Water Treatment Plant
Project Number: LV170004
Project Location: Marion, Kentucky

Liquid and Plastic Limits Test Report



	Boring	Depth (ft)	LL	PL	PI	Water Content	% < #40	% < #200	USCS	Description
●	B-101	6.5	31	15	16	19.5		79.0	CL	yellow LEAN CLAY with SAND
⊠	B-104	1.5	34	20	14	21.0		91.6	CL	yellow LEAN CLAY

Consulting Services Incorporated
11012 Decimal Drive
Louisville, Kentucky 40299
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PROJECT INFORMATION

Client: Eclipse Engineers, PLLC
Project Name: Marion Waste Water Treatment Plant
Project Number: LV170004
Project Location: Marion, Kentucky

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LABORATORY TESTING PROCEDURES

Soil Classification: Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our "Test Boring Records."

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary: grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D 2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

Rock Classification: Rock classifications provide a general guide to the engineering properties of various rock types and enable the engineer to apply past experience to current situations. In our explorations, rock core samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The rock cores are classified according to relative hardness and RQD (see Guide to Rock Classification Terminology), color, and texture. These classification descriptions are included on our Test Boring Records.

Atterberg Limits: Portions of the samples are taken for Atterberg Limits testing to determine the plasticity characteristics of the soil. The plasticity index (PI) is the range of moisture content over which the soil deforms as a plastic material. It is bracketed by the liquid limit (LL) and the plastic limit (PL). The liquid limit is the moisture content at which the soil becomes sufficiently "wet" to flow as a heavy viscous fluid. The plastic limit is the lowest moisture content at which the soil is sufficiently plastic to be manually rolled into tiny threads. The liquid limit and plastic limit are determined in accordance with ASTM D 4318.

Moisture Content: The Moisture Content is determined according to ASTM D 2216.

Percent Finer Than 200 Sieve: Selected samples of soils are washed through a number 200 sieve to determine the percentage of material less than 0.074 mm in diameter.

Rock Strength Tests: To obtain strength data for rock materials encountered, unconfined compression tests are performed on selected samples. In the unconfined compression test, a cylindrical portion of the rock core is subjected to increasing axial load until it fails. The pressure required to produce failure is recorded, corrected for the length to diameter ratio of the core and reported.

Compaction Tests: Compaction tests are run on representative soil samples to determine the dry density obtained by a uniform compactive effort at varying moisture contents. The results of the test are used to determine the moisture content and unit weight desired in the field for similar soils. Proper field compaction is necessary to decrease future settlements, increase the shear strength of the soil and decrease the permeability of the soil.

The two most commonly used compaction tests are the Standard Proctor test and the Modified Proctor test. They are performed in accordance with ASTM D 698 and D 1557, respectively. Generally, the Standard Proctor compaction test is run on samples from building or parking areas where small compaction equipment is anticipated. The Modified compaction test is generally performed for heavy structures, highways, and other areas where large compaction equipment is expected. In both tests a representative soil sample is placed in a mold and compacted with a compaction hammer. Both tests have three alternate methods.

Test	Method	Hammer Wt./ Fall	Mold Diam.	Run on Material Finer Than	No. of Layers	No. of Blows/ Layer
Standard D 698	A	5.5 lb./12"	4"	No. 4 sieve	3	25
	B	5.5 lb./12"	4"	3/8" sieve	3	25
	C	5.5 lb./12"	6"	3/4" sieve	3	56

Test	Method	Hammer Wt./ Fall	Mold Diam.	Run on Material Finer Than	No. of Layers	No. of Blows/ Layer
Modified D 15557	A	10 lb./18"	4"	No. 4 sieve	5	25
	B	10 lb./18"	4"	3/8" sieve	5	25
	C	10 lb./18"	6"	3/4" sieve	5	56

The moisture content and unit weight of each compacted sample is determined. Usually 4 to 5 such tests are run at different moisture contents. Test results are presented in the form of a dry unit weight versus moisture content curve. The compaction method used and any deviations from the recommended procedures are noted in this report.

Laboratory California Bearing Ratio Tests: The California Bearing Ratio, generally abbreviated to CBR, is a punching shear test and is a comparative measure of the shearing resistance of a soil. It provides data that is a semi-empirical index of the strength and deflection characteristics of a soil. The CBR is used with empirical curves to design pavement structures.

A laboratory CBR test is performed according to ASTM D 1883. The results of the compaction tests are utilized in compacting the test sample to the desired density and moisture content for the laboratory California Bearing Ratio test. A representative sample is compacted to a specified density at a specified moisture content. The test is performed on a 6-inch diameter, 4.58-inch-thick disc of compacted soil that is confined in a cylindrical steel mold. The sample is compacted in accordance with Method C of ASTM D 698 or D 1557.

CBR tests may be run on the compacted samples in either soaked or unsoaked conditions. During testing, a piston approximately 2 inches in diameter is forced into the soil sample at the rate of 0.05 inch per minute to a depth of 0.5 inch to determine the resistance to penetration. The CBR is the percentage of the load it takes to penetrate the soil to a 0.1 inch depth compared to the load it takes to penetrate a standard crushed stone to the same depth. Test results are typically shown graphically.

Consolidation Tests: Consolidation tests are conducted on representative soil samples to determine the change in height of the sample with increasing load. The results of these tests are used to estimate the settlement and time rate of settlement of structures constructed on similar soils. A consolidation test is performed according to ASTM D2435 on a single section of an undisturbed sample extruded from a sample tube. The sample is trimmed into a disc 2.5 inches in diameter and 0.75 inch thick. The disc is confined in a stainless steel ring and sandwiched between porous plates. It is then subjected to incrementally increasing vertical loads, and the resulting deformations are measured with a micrometer dial gauge. Void ratio are then calculated from these deformation readings. The test results are typically provided in tabular form or in the form of plots of void ratio versus applied stress (e-log p curves).

Organic Content: The Organic Content is determined according to ASTM D2974. The moisture content is first determined by drying portions of the sample at 105 degrees Celsius. The ash content is then determined by igniting the oven-dried sample from the moisture content determination in a muffle furnace at 440 degrees Celsius. The substance remaining after ignition is the ash. The organic content is expressed as a percentage by subtracting the percent ash from one hundred.

Direct Shear Tests: Direct shear tests are performed according to ASTM D3080 to determine the shear strength parameters of the soil. The specimen of soil is placed in a rigid box that is divided horizontally into two frames. The specimen is then confined under a vertical or normal stress and horizontal force is applied to fail the specimen along a horizontal plane at its mid-height.

Because drainage of the soil specimen cannot be easily controlled, undrained tests (i.e., UU and CU tests) are possible only on impervious soils and pore pressure measurements cannot be made. Drained tests (i.e., CD tests), however, are possible on all soil types. Since the drainage paths through the specimen are short and pore water pressures are dissipated fairly rapidly, the direct shear test is well suited to the CD test.

A minimum of three test specimens are required to establish the strength envelope of a soil. The soil parameters obtained are the cohesion and angle of internal friction.

Unconfined Compression Tests: The unconfined compression test is an unconsolidated-undrained triaxial shear test with no lateral confining pressure. This test is used to determine the shear strength of clayey soils. An unconfined compression test is performed according to ASTM D2166 on a single section of an undisturbed sample extruded from a sampling tube. The sample is trimmed to a length-to-diameter ratio of about 2 and placed in the testing device. Incrementally increasing vertical loads are applied until the sample fails. Test results are provided in the form of a stress-strain curve or a value representing the unconfined compressive strength of the sample.

Grain Size Tests: Grain Size Tests are performed to determine the soil classification and the grain size distribution. The soil samples are prepared for testing according to ASTM D421 (dry preparation) or ASTM D2217 (wet preparation). The grain size distribution of soils coarser than a number 200 sieve (0.074 mm opening) is determined by passing the samples through a standard set of nested sieves. Materials passing the number 200 sieve are suspended in water and the grain size distribution calculated from the measured settlement rate. These tests are conducted in accordance with ASTM D422.

Triaxial Shear Tests: Triaxial shear tests are used to determine the strength characteristics and friction angle of a given soil sample. Triaxial tests are also used to determine the elastic properties of the soil specimen. Triaxial shear tests are performed on several sections of a relatively undisturbed sample extruded from the sampling tube. The samples are trimmed into cylinders 1.4 to 2.8 inches in diameter and encased in rubber membranes. Each is then placed in a compression chamber and confined by all around water pressure. Samples are then subjected to additional axial and/or lateral loads, depending on the soil and the field conditions to be simulated. The test results are typically presented in tabular form or in the form of stress-strain curves and Mohr envelopes or p-q plots.

Three types of triaxial tests are normally performed. The most suitable type of triaxial test is determined by the loading conditions imposed on the soil in the field and the soil characteristics.

1. Consolidated-Undrained (designated as a CU or R Test).

2. Consolidated-Drained (designated as a CD or S Test).

3. Unconsolidated-Undrained (designated as a UU or Q Test).

Appendix V

Phase 1 Archaeological Investigation of Proposed WWTP Site

cra
cultural resource analysts, inc.

March 9, 2017

Alan Robinson, P.E.
President
Eclipse Engineers, PLLC
113 West Mount Vernon Street
Somerset, Kentucky 42501

RE: Cultural Historic Survey for the Proposed Marion Wastewater Treatment Plant Project in Crittenden County, Kentucky
CRA Project Number: I17E001
Contract Publication Series: 17-071

Dear Mr. Robinson:

In March 2017, Cultural Resource Analysts, Inc. (CRA), personnel completed a cultural historic survey for the proposed Marion Wastewater Treatment Plant in Crittenden County, Kentucky (Figure 1). The survey was conducted at the request of Alan Robinson of Eclipse Engineers, PLLC. The objective of the survey was to identify National Register of Historic Places (NRHP) listed or eligible properties within the area of potential effect (APE) for the proposed project. The APE has been defined as the proposed project area and any properties within the view shed surrounding it. An archaeological study is being conducted by CRA in conjunction with the cultural historic component; it will be submitted under a separate cover (Miller 2017).

Corporate Headquarters
151 Walton Avenue
Lexington, KY 40508
office 859.252.4737
fax 859.254.3747
www.crai-ky.com

A records review at the Kentucky Heritage Council (KHC) and Geographic Information System (GIS) data provided by KHC (FY17_2682) indicated that there are no previously surveyed properties within the APE. Joseph Miller of CRA completed the field work in March 2017 and identified two previously undocumented sites containing resources that appear to be 50 years of age or older (CN 89-90). Their locations are depicted on a topographic map and an aerial photograph, and descriptions and NRHP evaluations are included following this letter (Figures 1 and 2). The preparation of the letter report was performed by Holly B. Higgins, M.S., architectural historian.

No sites are recommended eligible for inclusion in the NRHP under Criterion A, B, or C. Therefore, CRA recommends that no historic properties will be affected by the proposed project.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Elizabeth Heavrin
Architectural Historian, Principal Investigator

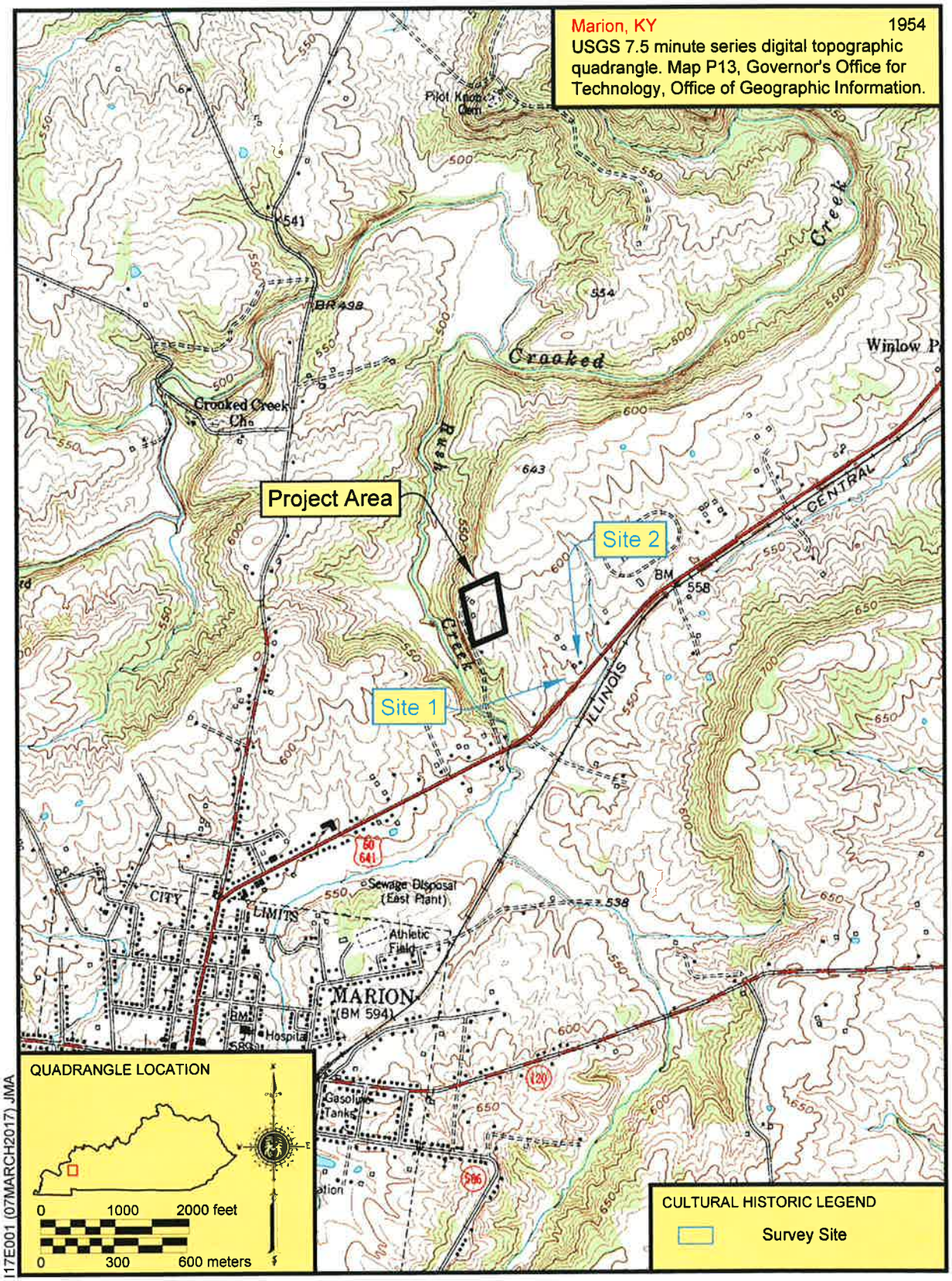

Figure 1. Topographic map depicting the proposed project area along with Sites 1-2.

Site 1

KHC Survey #: CN 89

Photographs: 3-5

Map: Figures 1 and 2

Zone: 16

Quad: 1960 Marion, Kentucky

UTMs: E: 405754 N: 4133944

Property Address:

1497 Sturgis Rd.
Marion, KY 42064

Construction Date: circa 1961-1967

Description: Site 1 consists of a residence and garage located at 1497 Sturgis Road. The structures are situated on a grassy, relatively level parcel. An asphalt driveway leads from the road to the attached carport, then on to the garage. The residence is not depicted on any topographic quadrangle, but based on its form and appearance likely dates to circa 1961–1967.

The residence (Resource A) is a one-story, four-bay (www/d/ww/w), double-pile, hip roof frame Linear Ranch house with an attached carport (Figure 3). It is situated on a concrete block foundation beneath an asphalt shingle roof and clad with a brick veneer. The primary entry exhibits a wood door set behind an aluminum storm door that opens onto a concrete stoop. A large wood picture window flanked by smaller two-over-two, double-hung wood sashes is located south of the entry. Paired two-over-two, double-hung wood windows are located just east of the entry. All other windows exhibit one-over-one, double-hung vinyl sashes with the exception of two windows along the southwest elevation, which exhibit the two-over-two configuration. Four window openings are located along the rear elevation (Figure 4). A secondary entry is located at the center of the east elevation and is comprised of a wood door set behind an aluminum storm door that opens onto the concrete pad of the carport. The roof is supported by cast metal columns.

The garage (Resource B) is located approximately 30 ft northwest of the residence (Figure 5). It is a one-story, front-gabled concrete block structure, situated beneath an asphalt shingle roof with exposed rafter tails. The area beneath the gable is clad with vinyl siding. A wood paneled door with a single window is located at the southern corner of the east elevation; a metal sectional garage door is located north of the wood door. Metal sliding sash windows are located at the center of the south, west, and north elevations.

NRHP Evaluation: Not Eligible. Research has not revealed any association between Site 1 and persons or events of historic importance; therefore, it is not eligible for listing in the NRHP under Criterion A or B. The property is also not eligible for listing in the NRHP under Criterion C. The Ranch house, characterized by its long, low form and large picture window is one of, if not the, most common house forms dating to the mid-twentieth century. As such, examples must demonstrate exceptional integrity and significance to be eligible for listing in the NRHP. While this example does retain its form and large picture window, it is nearly identical to countless examples located throughout the Commonwealth. The addition of replacement windows has also compromised its integrity of design, materials and workmanship. Therefore, CRA recommends that Site 1 is not eligible for listing in the NRHP under Criterion A, B, or C.

Determination of Effect: N/A.

Figure 5. Site 1 (CN 89): Garage (Resource B), facing northwest.

Site 2

KHC Survey #: CN 90

Photographs: 6-13

Map: Figures 1 and 2

Zone: 16

Quad: 1960 Marion, Kentucky

UTMs: E: 405806 N: 4134000

Property Address:

Sturgis Rd.
Marion, KY 42064

Construction Date: circa 1900-1924

Description: Site 2 consists of a residence, two garages, two sheds, an outbuilding, gambrel roof barn, livestock barn, and pole barn located along the northwest side of Sturgis Road (US 60), approximately .31 mi southwest of its intersection with Adams Street. The structures are situated at the end of an asphalt driveway on a level, grassy parcel; two concrete block pillars flank the driveway entrance (Figure 6). A pond is also located within the northwest portion of the property, near the gambrel roof barn. Wood post and rail fencing divides the residential structures from the agricultural structure. The house is first depicted on the 1954 Marion, Kentucky topographic quadrangle, but based on its form and appearance, it dates to circa 1900–1924.

Figure 7. Site 2 (CN 90): Bungalow (Resource A), facing north.

Figure 8. Site 2 (CN 90): Rear elevation (Resource A), facing south.

Figure 13. Site 2 (CN 90): Livestock barn and pole barn (Resources H and I), facing northwest.

References

Miller, Joseph
2017 A Cultural Resource Survey for the Proposed Marion Wastewater Treatment Plant Project in Crittenden County, Kentucky. Cultural Resource Analysts, Inc. Evansville, Indiana.

Contract Publication Series 16-548

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by
Joseph R. Miller, RPA

Prepared for

Eclipse Engineers, PLLC

Prepared by

cra
cultural resource analysts, inc

Kentucky | West Virginia | Ohio
Indiana | Louisiana | Tennessee | Virginia

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Prepared for

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CRA Project No.: I17E001

Andrew V. Martin, RPA
Principal Investigator

March 9, 2017

Lead Agency: Kentucky State Clearinghouse
OSA Project Registration No.: FY17_9097
KHC Project Registration No.: FY17_2682

ABSTRACT

On February 23, 2017, Cultural Resource Analysts, Inc., personnel conducted a cultural resource survey for the proposed wastewater treatment plant project in Crittenden County, Kentucky. The project was conducted at the request of Eclipse Engineers, PLLC. The project area is located in central Crittenden County, approximately 1.50 km (.93 mi) northeast of Marion, Kentucky. The project area encompasses approximately 3.45 ha (8.53 acres) and was investigated using systematic screened shovel testing.

Prior to conducting field research, a records review was conducted at the Office of State Archaeology. The review indicated that the project area had not been previously surveyed, and no previously recorded archaeological sites were located within the project area. Also prior to the field survey, a records review was conducted at the Kentucky Heritage Council. The review indicated that there were no previously recorded historic structures located within a 30.5 m (100.0 ft) buffer of the project area. The survey resulted in the documentation of one previously unrecorded archaeological site (Site 15Cn69). Site 15Cn69 is a prehistoric open habitation without mounds of indeterminate temporal affiliation. Due to the lack of research potential, Site 15Cn69 is recommended as not eligible for inclusion in the National Register of Historic Places and no further archaeological work is recommended for the project.

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I. INTRODUCTION

On February 23, 2017, Cultural Resource Analysts, Inc. (CRA), personnel conducted a cultural resource survey for the proposed wastewater treatment plant project in Crittenden County, Kentucky (Figure 1). The survey was conducted at the request of Eclipse Engineers, PLLC. Joseph Miller and Aaron Harth completed the fieldwork in approximately 15 person hours. Office of State Archaeology (OSA) Geographic Information Systems (GIS) data requested by CRA was returned on February 22, 2017. The results were researched on March 2, 2017. The OSA project registration number is FY17_9097. Kentucky Heritage Council (KHC) data requested on February 22, 2017, was returned on February 28, 2017. The KHC project registration number is FY17_2682.

Figure 1. Map of Kentucky showing the location of Crittenden County.

Purpose of Study

The study was conducted to comply with Section 106 of the National Historic Preservation Act.

The purpose of this assessment was to locate, describe, evaluate, and make appropriate recommendations for the future treatment of any archaeological sites that may be affected by the project. For the purposes of this assessment, a site was defined as "any location where human behavior has resulted in the deposition of artifacts, or other evidence of purposive behavior at least 50 years of age" (Sanders 2006:2). Cultural deposits less than 50 years of age were not considered sites, in accordance with "Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines" (National Park Service 1983).

A description of the project area, the field methods used, and the results of this investigation follow. The investigation conforms to the *Specifications for Conducting Fieldwork and Preparing Cultural Resource Assessment Reports* (Sanders 2006).

Project Description

The City of Marion is proposing the construction of a new wastewater treatment plant in Crittenden County, Kentucky. This new wastewater treatment plant will augment the current treatment plant located approximately 450 m (1,476 ft) southeast of the proposed project. The proposed treatment plant will be located in central Crittenden County, approximately 1.50 km (.93 mi) northeast of Marion, Kentucky (Figures 2 and 3). In total, the project will include approximately 3.45 ha (8.53 acres) of surface disturbance.

Summary of Findings

Prior to conducting field research, a records review was conducted at the OSA. The review indicated that the project area had not been previously surveyed, and no previously recorded archaeological sites were located within the project area. Also prior to the field survey, a records review was conducted at the KHC. The review indicated that there were no previously recorded historic structures located within a 30.5 m (100.0 ft) buffer of the project area. The survey resulted in the documentation of one previously unrecorded archaeological site (Site 15Cn69). Site 15Cn69 is a prehistoric open habitation without mounds of indeterminate temporal affiliation. Due to the lack of research potential, Site 15Cn69 is recommended as not eligible for inclusion in the NRHP and no further archaeological work is recommended for the project.

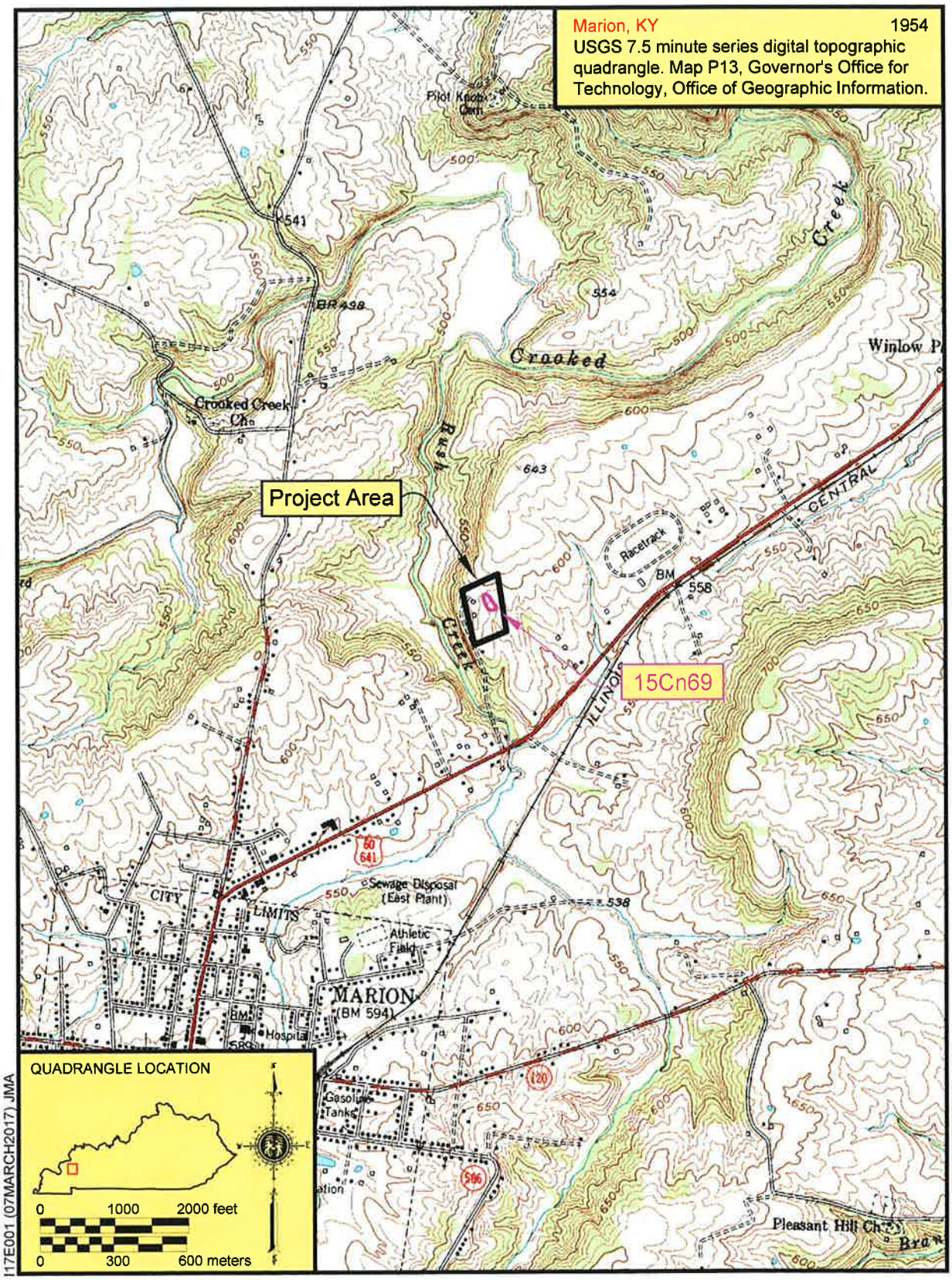

Figure 2. Location of project area on Marion, Kentucky, 7.5-minute series topographic quadrangle (United States Geological Survey [USGS] 1954).

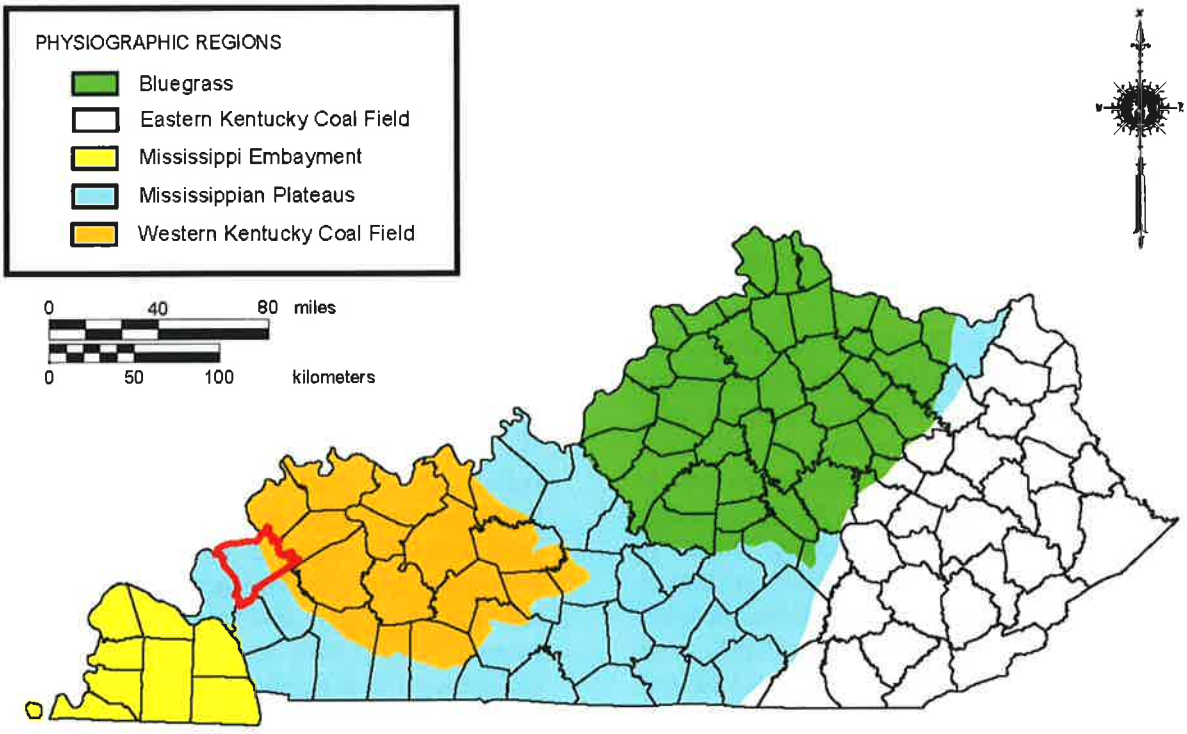

Figure 4. The Mississippian Plateaus region.

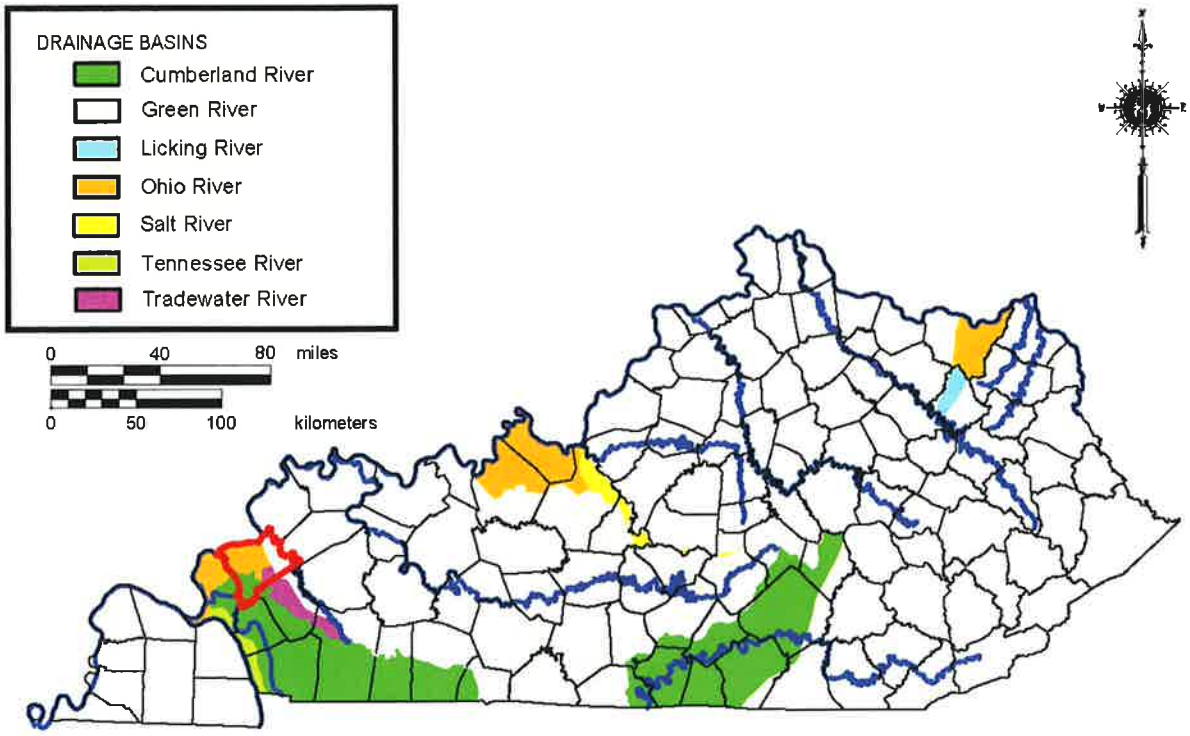

Figure 5. Rivers that drain the Mississippian Plateaus region.

Finally, there are small areas along the Ohio River predominately mapped as the Mollisols soil order. They are grassland soils, and because of the long-term addition of organic material to the soil from plant roots, the surface horizon is thick, dark, and fertile. They can exhibit clay, sodium and/or carbonate enriched, or even leached subsoil horizons. These soils formed on level to sloping ground in Late Pleistocene to Holocene or even earlier deposits and generally under grassland that could have been previously forested. They have the potential to contain deeply buried and intact archaeological deposits on level floodplain or terrace landforms (Soil Survey Staff 1999:555–557).

These areas are predominately mapped as the Udoll suborder of soils, which are mainly the more or less freely-drained Mollisols of humid climates in areas with well-distributed rainfall. They formed mainly in Late Pleistocene or Holocene deposits or on surfaces of comparable ages (Soil Survey Staff 1999).

Lithic Resources

The Mississippian Plateaus region displays very diverse and abundant sources of lithic raw material that could have been exploited by prehistoric inhabitants. There are rings of different geologic strata underlying the Mississippian Plateaus region and expanding out from the Western Kentucky Coal Field region that have been exposed by erosion through down cutting. The various members occur at different elevations and are mostly of Mississippian age. Areas of Vienna and Menard cherts are found within the Vienna and Menard Formations on the outer edges of the Western Kentucky Coal Field region (USGS 2011). A more continuous and wider ring of Mississippian-age limestone formations containing Haney, Girkin, and Paoli cherts surrounds the Vienna and Menard Formations. A large ring of Muldraugh chert-bearing limestone of the Muldraugh Formation then covers much of the rest of the western portion of the region. In the eastern third of the region, Mississippian-age limestone and dolomite strata of the Ste. Genevieve and St. Louis Formations contain Ste. Genevieve and St. Louis cherts. Mississippian-age Fort Payne chert is found in underlying limestone and sandstone outcrops in some of the dissected areas in the eastern third of the region. The more dissected areas of the eastern third expose Devonian to Mississippian-age shale, siltstone, limestone, and dolomite, as does the triangular-shaped wedge of the Mississippian Plateaus region in northeastern Kentucky. These areas can contain predominately Boyle and Brassfield cherts. In northeastern Kentucky, along the eastern edge of the triangular-shaped wedge of the Mississippian Plateaus region, Mississippian-age Newman Limestone containing Newman chert is found. Some areas of Pennsylvanian-age shale, siltstone, and sandstone deposits are preserved above the Mississippian deposits. They contain Breathitt chert primarily outcropping in the southeastern corner of the region.

The upland areas in the Land Between the Lakes region are underlain by Tertiary to Quaternary-age Continental deposits of loess, sand, and gravel (USGS 2011). Within these deposits in this region, Mounds Gravel is the predominate chert and is found on river and stream terraces and, secondarily, on gravel bars. It consists of chert pebbles and cobbles found in the redeposited Pliocene/Pleistocene gravels.

Prehistoric and Historic Climate

Climatic conditions during the period of human occupation in the region (Late Pleistocene and Holocene ages) can be described as a series of transitions in temperature, rainfall, and seasonal patterns that created a wide range of ecological variation, altering the survival strategies of human populations (Anderson 2001; Niquette and Donham 1985:6–8; Shane et al. 2001). The landscape during the Pleistocene was quite different from that of today. Much of the mid-continent consisted of periglacial tundra dominated by boreal conifer and jack-pine forests. Eastern North America was populated

unequivocal evidence for widespread human occupation across the southeastern United States" (Meeks and Anderson 2012:129). Event 3 coincided with the Clovis occupation in the region. A marked decline in the population is posited for Population Event 4 (12,800–11,900 cal. B.P.). This equates with the early to middle Younger Dryas and relates to a post-Clovis occupation of the region. Meeks and Anderson (2012:129) see a fragmentation of the regional Clovis culture at this time along with "the development of geographically circumscribed subregional, cultural traditions in the southeastern United States." A marked increase in population density is posited between 11,900 and 11,200 cal. B.P. This coincides with the late portion of the Younger Dryas and the early portion of the Holocene. Population Event 5 is represented by this time frame. Early Side Notched and Dalton are seen during this time.

During the Early Holocene, rapid increases in boreal plant species occurred on the Allegheny Plateau in response to the retreat of the Laurentide ice sheet from the continental United States (Maxwell and Davis 1972:517–519; Whitehead 1973:624). At lower elevations, deciduous species were returning after having migrated to southern Mississippi Valley refugia during the Wisconsinan advances (Delcourt and Delcourt 1981:147). The climate during the Early Holocene was still considerably cooler than the modern climate, and based on species extant at that time in upper altitude zones of the Allegheny Plateau, conditions would have been similar to the Canadian boreal forest region of today (Maxwell and Davis 1972:515–516). Conditions at lower elevations were less severe and favored the transition from boreal to mixed mesophytic species. At Cheek Bend Cave in the Nashville Basin, an assemblage of small animals from the Late Pleistocene confirms the environmental changes that took place during the Pleistocene to Holocene transition and the resulting extinction of Pleistocene megafauna and establishment of modern fauna in this area (Klippel and Parmalee 1982).

Traditionally, Middle Holocene (circa 8000–5000 B.P., also referred to as the Hypsithermal) climate conditions were thought to be consistently dryer and warmer than the present (Delcourt 1979:271; Klippel and Parmalee 1982; Wright 1968). The influx of westerly winds contributed to periods of severe moisture stress in the Prairie Peninsula and to an eastward advance of prairie vegetation (Wright 1968). More recent research (Anderson 2001; Shane et al. 2001:32–33) suggests that the Middle Holocene was marked by considerable local climatic variability. Paleoclimatic data indicate that the period was marked by more pronounced seasonality characterized by warmer summers and cooler winters.

The earliest distinguishable Late Holocene climatic episode began circa 5000 B.P. and ended around 2800 B.P. This Sub-Boreal episode is associated with the establishment of essentially modern deciduous forest communities in the southern highlands and increased precipitation across most of the mid-continental United States (Delcourt 1979:271; Maxwell and Davis 1972:517–519; Shane et al. 2001; Warren and O'Brien 1982:73). Changes in local and extra-local forests after approximately 4800 B.P. may also have been the result of anthropogenic influences. Fredlund (1989:23) reports that the Gallipolis pollen record showed increasing local disturbance of the vegetation from circa 4800 B.P. to the present, a disturbance that may have been associated with the development and expansion of horticultural activity. Based on a study of pollen and wood charcoal from the Cliff Palace Pond in Jackson County, Kentucky, Delcourt and Delcourt (1997:35–36) recorded the replacement of a red cedar–dominated forest with a forest dominated by fire-tolerant taxa (oaks and chestnuts) around 3000 B.P. The change is associated with increased local wildfires (both natural and culturally augmented) and coincided with increases in cultural utilization of upland (mountain) forests.

Beginning around 2800 B.P., generally warm conditions, probably similar to those of the twentieth century, prevailed during the

Figure 6. Overview of vegetation in the project area, facing northwest.

Figure 7. Overview of field conditions on the western edge of the project area, facing east.

radius included areas within the Marion quadrangle.

Previous Archaeological Surveys

On March 28, 1982, Arrow Enterprises personnel conducted an archaeological survey of a proposed apartment house complex in Crittenden County, Kentucky (Schock 1982). At the request of Jonathan Edwards of the Landura Corporation of the Southeast, 1.39 ha (3.44 acres) were investigated via intensive pedestrian survey. No archaeological sites were encountered and project clearance was recommended.

In April of 1990, Arrow Enterprises personnel conducted an archaeological survey of approximately .8 ha (2.0 acres) for proposed apartments for the elderly in Crittenden County, Kentucky (Schock 1990). The survey was conducted at the request of Thomas E. Fielder and consisted of metal detection, surface inspection of plowed areas, and shovel testing. One archaeological site (15Cn40) was documented during the survey.

Site 15Cn40 was a multicomponent prehistoric open habitation and historic farm/residence. The prehistoric component consisted of a minor lithic scatter of indeterminate temporal affiliation. The historic component consisted of a twentieth century residence which had been torn down 15 years prior to the survey. The site was considered ineligible for inclusion in the NRHP and no further work was recommended (Schock 1990).

On October 10, 1992, Arrow Enterprises personnel completed an archaeological survey for proposed apartments in Marion, Crittenden County, Kentucky (Schock 1992). At the request of Judy Gann of the Phillips Companies, approximately .8 ha (2.0 acres) were investigated via intensive pedestrian survey supplemented with screened shovel testing. No archaeological sites were identified and no further work was recommended.

In 2007, the Kentucky Archaeological Survey completed an archaeological survey of National Guard Armories in Kentucky (Schlarb and Winter 2007). The survey was requested by the Department of Military Affairs. An area of unspecified size was investigated by intensive pedestrian survey supplemented with screened shovel testing. Five newly recorded archaeological sites (15Ne93, 15Ml453, 15Jf712, 15Bl116, and 15Lo228) and five isolated finds were identified during the course of the survey. None of the archaeological sites were eligible for nomination to the NRHP and no further work was recommended. None of the sites were located within the 2 km search radius of the current project area.

Site 15Cn54 did not have an associated report on file at OSA, but the site form found in OSA records indicated that it was a historic farm/residence dating from 1851–1950. The site was documented by M. Jay Stottman of Kentucky Archaeological Survey in March of 2009 (Stottman 2009). The site was considered ineligible for inclusion in the NRHP.

Archaeological Site Data

According to available data, 61 archaeological sites have been recorded in Crittenden County (Table 1). The site data indicates that the majority of archaeological sites recorded in Crittenden County consist of open habitations without mounds (n = 39; 63.93 percent). Other site types in the county include cemeteries, earthen mounds, historic farms/residences, isolated finds, open habitations with mounds, quarries, and rockshelters.

The time-periods most frequently represented by Crittenden County sites are indeterminate prehistoric (n = 24; 35.29 percent) and Archaic (n = 24; 35.29 percent). Late prehistoric sites were also common, with 11.76 percent. The Woodland period was the next most common, with 8.82 percent. Paleoindian and historic sites comprise a combined 8.82 percent of the Crittenden County sites. Unspecified sites are not represented (0 percent) in the Crittenden County sites.

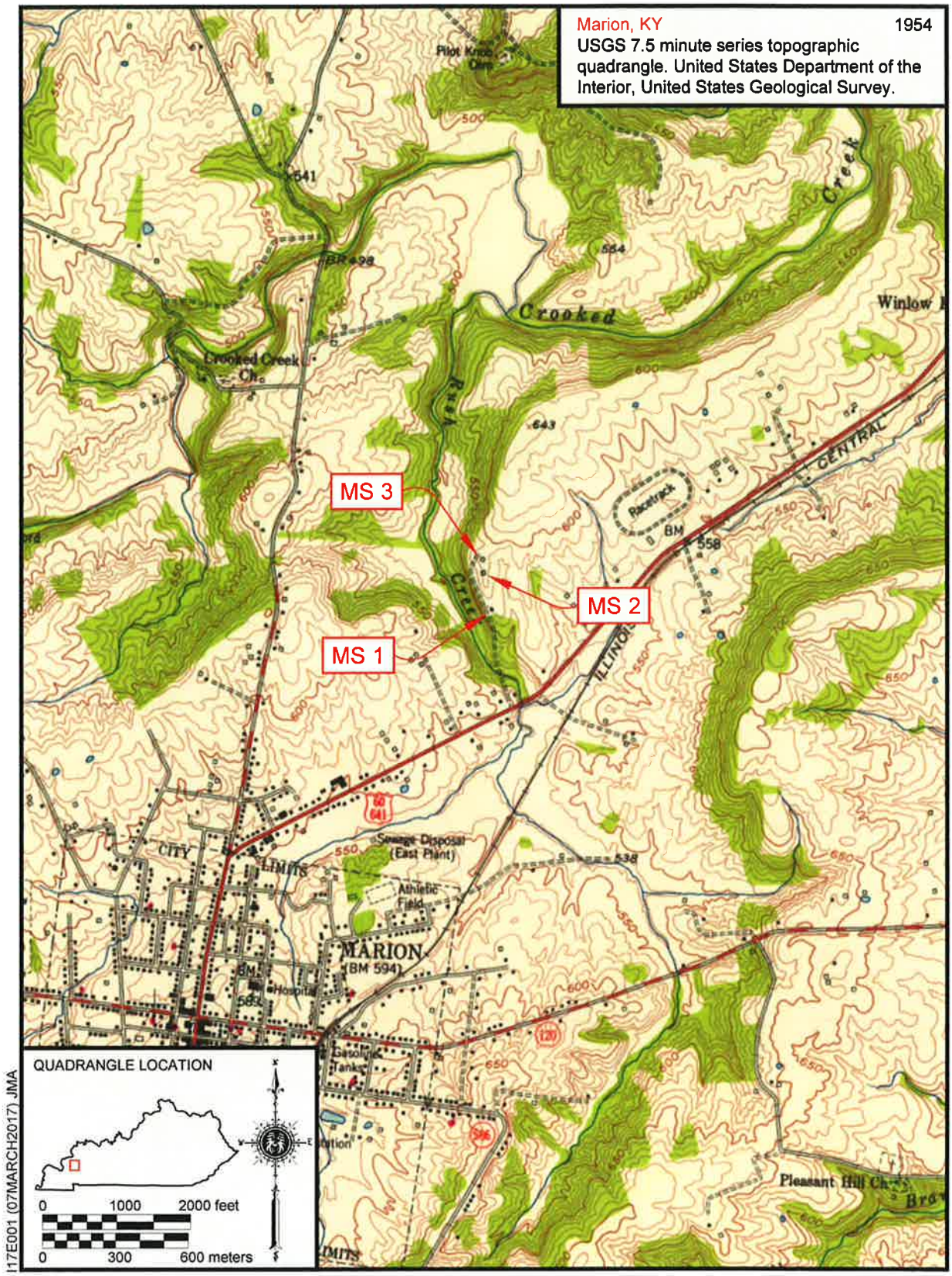

Figure 8. 1954 topographic map showing the locations of MS 1–3.

Cultural Overview

This overview includes a review of both the prehistory and history of western Kentucky. The discussion begins with the first appearance of Native Americans in the region and ends with the settlement of the area by European and American populations.

Early Human Occupation (Before 11,500 B.C.)

The timing and actual entry point of the first humans into North America are still topics for debate. The general consensus remains that humans entered North America from Asia via the Bering Strait. Waters and Stafford (2013:557) summarized the currently available data and conclude that the First Americans originated in Central Asia and started entering the New World circa 16,000 B.P. Clovis developed later and was a New World construct.

Several sites in the southeastern United States have been suggested as pre-Clovis candidates. Among these are the Cactus Hill site in southeast Virginia (McAvoy and McAvoy 1997; Wagner and McAvoy 2004), the Topper site in South Carolina (Chandler 2001; Goodyear 1999; Goodyear and Steffy 2003), and the Debra L. Friedkin site in Texas (Waters et al. 2011). Despite the evidence of pre-Clovis occupations in many areas, to date, no definitive pre-Clovis occupations or materials have been found in Kentucky (Maggard and Stackelbeck 2008:114).

The Paleoindian Period (11,500–8000 B.C.)

The Paleoindian period is the earliest cultural period conclusively documented in Kentucky. The arrival of humans in the region was probably linked to the movements of the Pleistocene glaciers. During the Paleoindian period, the last of these glacial advances and retreats, called the Greatlakean Stadial (post-9900 B.C.), occurred.

Distinctive lanceolate, often fluted, hafted bifaces called "Clovis" are the hallmark of the early part of the Paleoindian period (Maggard and Stackelbeck 2008). Unifacially and bifacially chipped tools, such as knives, scrapers, spokeshaves, drills, gravers, and endscrapers with spurs, have also been recovered. Archaeologists infer that artifacts and tools of wood, bone, and shell were also used, although they were rarely preserved. While a number of archaeologists have argued that Paleoindians were predominately big game hunters (e.g., Bonnichsen et al. 1987; Kelly and Todd 1988; Stoltman and Baerreis 1983), more recent review of the topic (Meltzer 1993) concluded that there is no widespread evidence for the specialized hunting of big game species (i.e., megafauna). Several authors (e.g., Davis 1993; Dincauze 1993; Meltzer 1993) now argue that the Paleoindian diet was more generalized and relied on a number of faunal and floral species. Megafauna would have been taken when encountered, but not to the exclusion of other species. Such indications of exploitation of megafauna in Kentucky are present at the Adams mastodon site in Harrison County, Kentucky. Here, the remains of a single mastodon with cut marks on the bones were found in association with large limestone slabs. The configuration of the skeletal remains, in addition to the above evidence, has been interpreted as representative of a possible butchering site (Duffield and Boisvert 1983; Walters 1988).

According to Freeman et al. (1996:402), most Paleoindian sites in Kentucky "represent short, ephemeral occupations that occur in shallow, deflated, or severely disturbed deposits" and larger sites are in "areas that provide high-quality lithic raw material, or topographic features or resources that would have attracted and concentrated game." Away from lithic source areas, for example, larger sites often "occur in association with ponded or slow-moving water, at stream confluences and fords, along major game trails, and at mineral springs" (Freeman et al. 1996:402).

With the retreat of the glaciers, the Transitional Paleoindian/Early Archaic sites of the Dalton culture are slightly more numerous than the earlier Paleoindian sites. Sites dating

adjacent to the mounds (Clay 1983). Small open-air domestic sites are increasingly being discovered and investigated (Kerr and Creasman 1995; Niquette and Boedy 1986; Niquette et al. 1987). Although hunting was important in the Middle Woodland, discoveries from rockshelters suggest that manipulation of domesticated native plants intensified by this time. Despite this change, the additional food supply did not create significant changes in the way people lived (Railey 1996).

For the most part, early Middle Woodland ceramics tend to have plain exterior surfaces, except in the Mississippi Embayment, where fabric marking persists, and the hafted bifaces consist of Adena and other similar stemmed forms (Applegate 2008; Niquette 1989). Late Middle Woodland pots are commonly cordmarked or plain, but small numbers of Hopewellian style simple stamped or checked stamped sherds from this period are also known (Webb 1942). Crosshatched rims and cord-impressed decoration were added to the earlier fabric-impressed surfaces. Late Middle Woodland hafted bifaces are weakly shouldered, expanded, or shallow side-notched forms. Alongside these other changes, a decline in the building of burial mounds was seen during the Middle Woodland (Applegate 2008).

Middle Woodland peoples continued the technologies developed in the Archaic and Early Woodland subperiods; however, there were changes as well. A chert bladelet industry developed exclusively during the Middle Woodland period. It produced small and sharp chert tools that were used in fine work. In addition, exotic materials—copper, mica, and on rare occasions, obsidian—were obtained through trade from distant sources. These artifacts are typically known from mortuary sites in Kentucky (Applegate 2008:352).

Late Woodland (A.D. 400–1000)

After circa A.D. 400, earthen burial mounds went out of style in the region. The construction and use of earthen or stone enclosures also ceases by approximately A.D. 500. Simpler communal burial sites, generally involving stone constructions or coverings, became widespread, perhaps as a replacement for the mounds (Brown 1981; Clay 1984). The nature of human settlement also changed. Evidence from sites of the subperiod indicates that Native-American groups often returned repeatedly to the same location or congregated in larger groups. However, the possible lack of permanent shelter at these sites suggests that the use of these places was sporadic, possibly seasonal, perhaps still related to certain group ceremonies (Clay 2002:174–182). Rockshelters continued to be used during this subperiod as short-term habitations or temporary hunting locales.

The economy continued to emphasize hunting, gathering, and the utilization of a variety of locally domesticated plants. While maize (i.e., corn) was introduced in the region during the Middle Woodland period, it did not become an important part of the diet until around A.D. 800. The importance of maize is more pronounced in the western portions of Kentucky at this time.

Like the Middle Woodland, the Late Woodland is often divided into early and late subdivisions. Early Late Woodland ceramic assemblages are generally cordmarked and are similar to late Middle Woodland assemblages; however, there is usually a lack of Hopewellian style decorated ceramics. Ceramics consist mainly of subconical and subglobular cordmarked jars (Applegate 2008:345–346). Early Late Woodland hafted bifaces are typically expanding stem or crude side-notched forms.

The late Late Woodland saw increased regional variability in ceramic styles, subsistence strategies, and social organization (Applegate 2008), although there are distinct continuities expressed in settlement organization (Clay 2002). Ceramics exhibit cordmarked and now some plain surface treatments; some vessels have angular shoulders; and rims display special treatments, like collars, carinations, and castellations. In the lower Ohio River valley and far western Kentucky, necks of vessels exhibit zoned,

Tennessee River "as the road to Carolina" (Kelly 1977:2). French, British, and Spanish traders all potentially had contacts with the Indian groups, such as Chickasaw and Cherokee, in the valley (Henry 1976:9). Archaeological evidence for contact with resident Indian groups during this period, spanning Spanish, French, and British exploration may be the pottery vessel with an iron bail or rivet recovered from the Stone site on the Cumberland River in Tennessee (Carstens 1992). American explorations also took place in the area during the latter part of the eighteenth century and the beginning of the nineteenth century, but like the earlier explorations, there are currently insufficient data on these.

At the beginning of the seventeenth century, Kentucky was populated by several sedentary Native American cultural groups (Schwartz 1967). The Beaver Wars of the mid-seventeenth century, however, had almost completely disrupted and uprooted these groups by about 1680 (Hunt 1940). Even prior to the Beaver Wars, Native American residential populations were affected by European diseases and technology through indirect contact with Europeans from the eastern seaboard. Afterwards, the area was used primarily as hunting land, and later the use of the region was reshaped in the wake of shifting fur trade patterns. Resident aboriginal groups were increasingly being displaced by newly arriving Native American groups as a result of this shifting pattern (Hunter 1978:588).

In the early eighteenth century, Native-American tribes, who we can identify as the Shawnee, were present in most areas of Kentucky, having been pushed westward from the east (i.e., from the Susquehanna drainage of Pennsylvania) by the expansion of European settlement (McConnell 1992:21). Other established tribes in Kentucky at the time include the Cherokee in the Upper Cumberland River valley area and the Chickasaw in the Lower Tennessee and Cumberland River valleys and far western Kentucky. Conflicts between these and other groups in the region lasted through the War of 1812. They were a part of the conflict between the French and British and later the British and the new American colonies (Hammack 1992:928–929; McBride and McBride 2008; O'Donnell 1992:815).

The first Europeans to visit Kentucky included explorers, trappers, traders, and surveyors. It was in the 1750s, when the English Crown attempted to colonize the Ohio Valley, that the first organized attempt to settle Kentucky occurred. This attempt stimulated the formation of land companies that sent surveyors into the area (McBride and McBride 2008:909). One of these, the Ohio Land Company, sent a surveyor into Kentucky in 1751. The French and Indian War that erupted in 1754 disrupted this early exploration (Talbert 1992:689).

In 1763, England's King George III set aside the land west of the Appalachians for Indians and English fur traders and closed the area to permanent settlement. His decree was ignored, however, and further colonial exploration and development could not be stopped. One man who took advantage of the commercial expansion westward was Daniel Boone. Boone first explored Kentucky in 1767, and by 1769, he had explored much of the Red and Kentucky River valleys. Harrodsburg was established soon after in 1774, followed by Boonesboro in 1775. The western movement of the American frontier pushed the Native Americans further and further west, and Kentucky was one of the places where they decided to take a stand. In response, Governor Dunmore (of Virginia) waged two large campaigns in the Ohio Valley (later known as Dunmore's War), and the Native Americans were defeated. Dunmore's War opened Kentucky for settlement, although some hostilities continued after this time (Nickell 1992:96–98; Stone 1992:571).

Kentucky was originally a part of Virginia called the Kentucky District. The Kentucky District contained three counties, Fayette, Lincoln, and Jefferson, which became the Commonwealth of Kentucky on June 1, 1792 (Clark 1992). These three counties were later divided and subdivided into the 120 counties

attributes of these artifacts into a computer-coding format. The final step was to enter all artifact codes into an Access database, where data could later be manipulated. The lithic coding format used is presented in Appendix A. All the lithic artifact data is presented in Appendix B and is summarized and discussed below.

A paradigmatic classification system (Dunnell 1971:70–76) was used to code lithic artifacts for analysis. In this form of classification, dimensions, or mutually exclusive features, are recorded for each artifact. Within each dimension are several possible attribute states. Artifact classes can then be defined by the intersection of these attribute states (Dunnell 1971:73). The scale of investigation and the determination of the classes examined are guided by the questions being asked of the data. This form of analysis is preferred over typological formats for the following reasons:

1) Lithic reduction is a dynamic process; therefore, analytically forcing lithic material into static "types" is counterproductive to actually understanding prehistoric lithic technologies.
2) No a priori assumptions are necessary concerning the meaning of classes, as is common in typological formats.
3) Mutually exclusive classes are formed.
4) Analysis is possible at various levels of detail.
5) Classification does not obscure artifact variability (i.e., functional, stylistic, technological, and morphological) to the extent that typologies do.
6) Classification allows several different analytical techniques to be used to support or reject hypotheses generated of the data.

Raw Materials

Raw material type was determined as to parent geological formation when possible. Determination of raw material type was made using published descriptions and by comparisons with a sample collection of locally occurring chert housed at CRA. Flakes smaller than .25 inch in size were counted and weighed, and usually no additional attributes are recorded. Raw material type is usually not assessed for these flakes, as they often exhibit no diagnostic characteristics that can be used to confidently identify a raw material type. Regardless, all flakes smaller than .25 inch were briefly examined in the event that an obvious raw material identification could be made. During the current analysis, the raw material for the flakes smaller than .25 inch in size was easily identified.

The examination of raw materials used in chipped stone manufacture is important for several reasons. As Binford (1979:260) notes, variability in the proportions of raw material at a site is a function of the scale of the habitat exploited from that location. It is recognized, however, that the proportions of raw materials recovered from a site likely represent only the minimal extent of a group's annual range (Ingbar 1994). The distribution and quality of raw materials are important factors that condition their use (Andrefsky 1994). A number of raw materials may be sufficient for chipped stone tool production; however, "certain materials may be chosen over others because of differences in mechanical efficiency at hand" (Beck and Jones 1990:284).

To provide some inference of raw material procurement and utilization, two categories based on distance to known chert source areas were employed. These categories consisted of local and non-local sources. A local source is one that is considered close to a specific location. In the case of the current project, this distance is considered less than 30.0 km (18.6 mi). Non-local resources are considered those materials that are available within more than a day of travel, typically greater than 30 km distance.

The project area is in the Mississippi Plateau region, which has several sources of chert. Chert is reported in the Ste. Genevieve Limestone formation on the Marion, Kentucky quadrangle (Trace 1966), and in the St. Louis and Ste. Genevieve Limestone formations on the Cave In Rock, Kentucky quadrangle

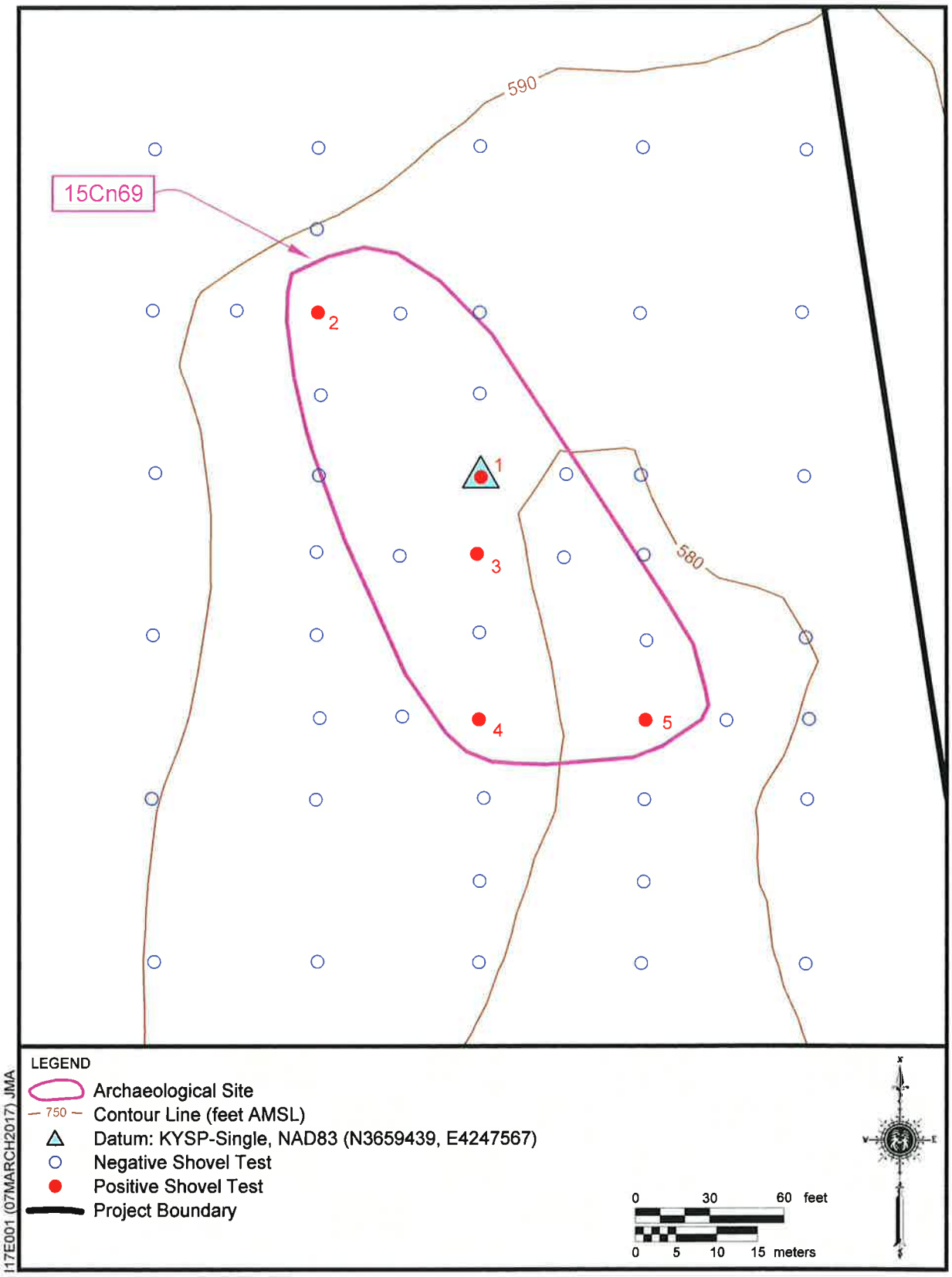

Figure 11. Site 15Cn69 schematic map.

the proposed wastewater treatment plant project in Crittenden County, Kentucky. The project was conducted at the request of Eclipse Engineers, PLLC. The project area is located in central Crittenden County, approximately 1.50 km (.93 mi) northeast of Marion, Kentucky. The project area encompasses approximately 3.45 ha (8.53 acres) and was investigated using systematic screened shovel testing.

Prior to conducting field research, a records review was conducted at the OSA. The review indicated that the project area had not been previously surveyed, and no previously recorded archaeological sites were located within the project area. Also prior to the field survey, a records review was conducted at the KHC. The review indicated that there were no previously recorded historic structures located within a 30.5 m (100.0 ft) buffer of the project area. The survey resulted in the documentation of one previously unrecorded archaeological site (Site 15Cn69). Site 15Cn69 is a prehistoric open habitation without mounds of indeterminate temporal affiliation. Due to the lack of research potential, Site 15Cn69 is recommended as not eligible for inclusion in the NRHP and no further archaeological work is recommended for the project.

Note that a principal investigator or field archaeologist cannot grant clearance to a project. Although the decision to grant or withhold clearance is based, at least in part, on the recommendations made by the field investigator, clearance may be obtained only through an administrative decision made by the lead federal agency in consultation with the State Historic Preservation Office (the KHC).

If any previously unrecorded archaeological materials are encountered during construction activities, the KHC should be notified immediately at (502) 564-6662. If human skeletal material is discovered, construction activities should cease, and the KHC, the local coroner, and the local law enforcement agency must be notified, as described in KRS 72.020.

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APPENDIX A. LITHIC ANALYSIS CODING FORMATS

Flake Debris Analysis Codes

1) Size Grade:

1: less than ¼ inch
2: ¼ to < ½ inch
3: ½ to < ¾ inch
4: ¾ to <1 in
5: 1+ inch

2) Count

3) Weight (to nearest 0.1 gram)

4) Portion

0: <1/4"
1: Complete
2: PRB
3: Fragment
4: Blocky
5: Thermal Shatter

5) Platform

0: Not present
1: Lipped
2: Cortical
3: Non lipped, non cortical
4: Broken

6) Stage (based on platform facet count and dorsal flake scar count)

0: Blocky
1: Early
2: Middle
3: Late
4: Biface thinning

7) Thermal Alteration

0: No evidence
1: Color change (possible alteration)
2: Partial dull, partial gloss
3: Gloss both faces
4: Crenulations, crazing, potlids
5: Differential thermal damage
8: Indeterminate
9: Not applicable

8) Cortex Cover

0: None
1: Dorsal only
2: Platform only
3: Dorsal and platform

9) Cortex Type

0: None present
1: Matrix/residual
2: Waterworn cobble
3: Patination
9: Indeterminate

10) Raw Material:

026: St. Louis
029a: St. Louis or Ste. Genevieve

Dimension 12: Basal Shape (class 204)

1: incurvate
2: excurvate
3: straight
4: bifurcate
5: indeterminate

Dimension 13: Haft Element (class 204)

1: side notched
2: corner notched
3: straight stem
4: contracting stem
5: expanding stem
6: no definable haft (lanceolate)
7: fluted
8: no haft element
9: Indeterminate

Dimension 14: Blank Type (all classes)

1: indeterminate
2: core
3: flake
4: tabular block
5: river gravel

Dimension 15: Edge Angle (Classes 201, 204, 207, and 201) to nearest degree

Table B-1. Flake Debris Data.

Bag	Site	Unit #	Depth	Count	Wt(g)	Size	Portion	Platform	Stage	Therm Alt	Cortex Type	Cortex Cover	Material
001	15Cn69	STP 1	0-14 cm bgs	1	0.6	2	3	0	3	-	0	-	026
002	15Cn69	STP 2	0-13 cm bgs	1	1	2	3	0	3	-	0	0	026
003	15Cn69	STP 3	0-22 cm bgs	1	0.2	1	0	-	-	-	-	-	029a
004	15Cn69	STP 4	0-11 cm bgs	2	0.3	1	0	-	-	-	-	-	029a
005	15Cn69	STP 5	0-20 cm bgs	1	1.3	3	2	4	3	-	3	1	029a

Appendix W

2014-2016 City of Marion MOR Summary

City of Marion, KY
Marion WWTP RAW Data
Monthly Operation Report 2014
NPDES Permit No. KY0020061

Date	Rain (Inches)	Total Flow (Million Gallons)	pH	Suspended Solids (Mg/L)	5 Day BOD (Mg/L)	Activated Sludge Return (Gal/Day x 1000)	Activated Sludge Wasted (Gal x 1000)	NH3-N (Mg/L)
January 1, 2014		0.88				0.47		
January 2, 2014	0.09	0.89	7.92	256.00	69.00	0.47		21.80
January 3, 2014	Trace	0.98				0.47		
January 4, 2014		0.90				0.47		
January 5, 2014	0.39	1.27				0.47		
January 6, 2014	0.14	1.01				0.47		
January 7, 2014		0.90	7.78	36.00	98.00	0.47		7.60
January 8, 2014		0.91				0.47		
January 9, 2014	0.02	0.99				0.47		
January 10, 2014	0.01	1.46				0.47		
January 11, 2014	0.95	1.81				0.47		
January 12, 2014		1.60				0.47		
January 13, 2014	0.03	1.64				0.47	3.20	
January 14, 2014	0.12	1.43	7.09	44.00	74.00	0.47		8.30
January 15, 2014	0.01	1.23				0.47		
January 16, 2014	Trace	1.14				0.47		
January 17, 2014	Trace	1.27				0.47		
January 18, 2014		0.87				0.47		
January 19, 2014		0.99				0.47		
January 20, 2014		0.62				0.47		
January 21, 2014	Trace	0.86	7.64	116.00	105.00	0.47		19.40
January 22, 2014	Trace	0.85				0.47		
January 23, 2014		0.79				0.47		
January 24, 2014		0.93				0.47		
January 25, 2014	Trace	0.80				0.47		
January 26, 2014		0.73				0.47		
January 27, 2014		0.73				0.47		
January 28, 2014		0.72	7.87	220.00	120.00	0.47		16.70
January 29, 2014		0.69				0.47		
January 30, 2014		0.69				0.47		
January 31, 2014		0.84				0.47		
February 1, 2014		1.13				0.47		
February 2, 2014		1.36				0.47		
February 3, 2014	1.11	1.35				0.47		

February 4, 2014		1.55	7.47	108.00	114.00	0.47		13.80
February 5, 2014	0.75	1.81				0.47		
February 6, 2014	Trace	1.57				0.47		
February 7, 2014	Trace	1.35				0.47		
February 8, 2014	0.03	1.08				0.47		
February 9, 2014	Trace	1.09				0.47		
February 10, 2014		1.05				0.47		
February 11, 2014		0.98	7.62	64.00	113.00	0.47		11.30
February 12, 2014		1.01				0.47		
February 13, 2014		1.17				0.47		
February 14, 2014	0.35	1.81				0.47		
February 15, 2014		1.45				0.47		
February 16, 2014		1.15				0.47		
February 17, 2014		1.63				0.47		
February 18, 2014	0.25	1.76	7.37	240.00	183.00	0.47		8.62
February 19, 2014		1.67				0.47		
February 20, 2014		1.60				0.47		
February 21, 2014	0.34	1.76				0.47		
February 22, 2014		1.34				0.47		
February 23, 2014		1.05				0.47		
February 24, 2014		1.03				0.47		
February 25, 2014		0.95	7.42	60.00	60.00	0.47		12.90
February 26, 2014	Trace	0.93				0.47		
February 27, 2014		0.88				0.47		
February 28, 2014		1.01				0.47		
March 1, 2014	0.78	0.99				0.47		
March 2, 2014		0.98				0.47		
March 3, 2014	1.04	1.23				0.47		
March 4, 2014		1.20	7.54	216.00	73.00	0.47		11.26
March 5, 2014		1.23				0.47		
March 6, 2014		1.24				0.47		
March 7, 2014		1.34				0.47		
March 8, 2014		1.28				0.47		
March 9, 2014		1.16				0.47		
March 10, 2014		1.27				0.47		
March 11, 2014		1.24	7.30	180.00	280.00	0.47		11.96
March 12, 2014	0.05	1.09				0.47		
March 13, 2014		1.02				0.47		
March 14, 2014		1.08				0.47		
March 15, 2014		1.11				0.47		
March 16, 2014	0.27	0.93				0.47		
March 17, 2014	0.20	1.27				0.47		

March 18, 2014		1.26	7.07	224.00	233.00	0.47		20.40
March 19, 2014	Trace	1.09				0.47		
March 20, 2014		1.01				0.47		
March 21, 2014		1.03				0.47		
March 22, 2014		0.87				0.47		
March 23, 2014		0.79				0.47		
March 24, 2014		0.84				0.47	3.20	
March 25, 2014	0.01	0.79	7.46	112.00	52.00	0.47	3.20	11.90
March 26, 2014	Trace	0.77				0.47	3.20	
March 27, 2014	Trace	0.95				0.47		
March 28, 2014	0.56	1.81				0.47		
March 29, 2014	0.92	1.28				0.47		
March 30, 2014		0.87				0.47		
March 31, 2014		1.25				0.47		
April 1, 2014		1.05	7.53	72.00	39.00	0.47		8.00
April 2, 2014		1.24				0.47	4.90	
April 3, 2014	1.59	1.41				0.47		
April 4, 2014	1.58	1.36				0.47		
April 5, 2014		1.27				0.47		
April 6, 2014		1.23				0.47		
April 7, 2014	0.08	1.27				0.47		
April 8, 2014	0.38	1.33	7.41	300.00	308.00	0.47		9.70
April 9, 2014	0.59	1.30				0.47		
April 10, 2014		1.24				0.47	3.20	
April 11, 2014		1.31				0.47	3.20	
April 12, 2014		1.26				0.47		
April 13, 2014		0.91				0.47		
April 14, 2014	1.30	1.34				0.47		
April 15, 2014	0.34	1.31	7.07	184.00	161.00	0.47		7.30
April 16, 2014		1.28				0.47		
April 17, 2014		1.28				0.47		
April 18, 2014		1.10				0.47		
April 19, 2014		1.01				0.47		
April 20, 2014		0.92				0.47		
April 21, 2014		0.91				0.47	3.20	
April 22, 2014	0.01	0.82	7.36	116.00	92.00	0.47	3.20	10.90
April 23, 2014		0.81				0.47	4.90	
April 24, 2014		0.99				0.47	3.20	
April 25, 2014	0.80	1.25				0.47		
April 26, 2014		1.07				0.47		
April 27, 2014		1.01				0.47		
April 28, 2014	2.21	1.40				0.47		

April 29, 2014	0.60	1.32	7.61	260.00	105.00	0.47		4.90
April 30, 2014	0.13	1.28				0.47		
May 1, 2014		1.25				0.47		
May 2, 2014		1.18				0.47		
May 3, 2014		0.99				0.47		
May 4, 2014		0.90				0.47		
May 5, 2014		0.84				0.47	6.50	
May 6, 2014		0.82	7.52	76.00	96.00	0.47		8.62
May 7, 2014		0.76				0.47		
May 8, 2014	Trace	0.71				0.47		
May 9, 2014	1.24	1.22				0.47		
May 10, 2014		1.08				0.47		
May 11, 2014	0.09	0.69				0.47		
May 12, 2014		0.83				0.47		
May 13, 2014	0.01	0.96	7.52	300.00	123.00	0.47		12.90
May 14, 2014	0.50	1.89				0.47		
May 15, 2014	1.51	1.80				0.47		
May 16, 2014	0.03	1.38				0.47		
May 17, 2014		1.01				0.47		
May 18, 2014		0.88				0.47		
May 19, 2014		0.98				0.47		
May 20, 2014		0.82	7.38	164.00	80.00	0.47		10.80
May 21, 2014		0.78				0.47	3.20	
May 22, 2014		0.80				0.47	3.20	
May 23, 2014	0.18	0.83				0.47		
May 24, 2014		0.70				0.47		
May 25, 2014		0.59				0.47		
May 26, 2014		0.53				0.47		
May 27, 2014	1.34	1.02	7.71	84.00	146.00	0.47		9.90
May 28, 2014		0.99				0.47		
May 29, 2014		0.84				0.47	6.50	
May 30, 2014		1.08				0.47		
May 31, 2014	0.57	1.02				0.47		
June 1, 2014	0.01	0.93				0.47		
June 2, 2014	0.13	1.19				0.47		
June 3, 2014	1.52	1.41	7.75	116.00	103.00	0.47		11.10
June 4, 2014		1.62				0.47		
June 5, 2014	1.10	1.87				0.47		
June 6, 2014	Trace	1.61				0.47		
June 7, 2014		1.40				0.47		
June 8, 2014	0.22	0.80				0.47		
June 9, 2014	0.02	1.07				0.47	3.20	

June 10, 2014	0.22	1.38	8.02	128.00	55.00	0.47	3.20	12.20
June 11, 2014	0.48	1.26				0.47		
June 12, 2014		1.07				0.47		
June 13, 2014		1.11				0.47		
June 14, 2014		0.80				0.47		
June 15, 2014		0.73				0.47		
June 16, 2014		0.69				0.47		
June 17, 2014		0.66	7.73	136.00	101.00	0.47		7.80
June 18, 2014		0.61				0.47	6.50	
June 19, 2014		0.74				0.47	6.50	
June 20, 2014	0.05	0.76				0.47		
June 21, 2014		0.52				0.47		
June 22, 2014		0.53				0.47		
June 23, 2014		0.99				0.47	9.80	
June 24, 2014	0.67	1.01	7.66	60.00	71.00	0.47	9.80	9.40
June 25, 2014	0.29	0.76				0.47	9.80	
June 26, 2014		1.02				0.47	19.50	
June 27, 2014	1.78	0.87				0.47	3.20	
June 28, 2014	0.01	0.70				0.47		
June 29, 2014		0.62				0.47		
June 30, 2014		0.61				0.47	9.80	
July 1, 2014		0.72	7.34	236.00	119.00	0.47	9.80	11.70
July 2, 2014	0.24	0.73				0.47	9.80	
July 3, 2014		0.65				0.47	14.60	
July 4, 2014		0.65				0.47		
July 5, 2014		0.51				0.47		
July 6, 2014		0.35				0.47		
July 7, 2014		0.50				0.47	9.80	
July 8, 2014	0.04	0.49	7.63	96.00	132.00	0.47	3.20	12.12
July 9, 2014		0.59				0.47	9.80	
July 10, 2014		0.46				0.47	9.80	
July 11, 2014		0.46				0.47	6.50	
July 12, 2014		0.53				0.47		
July 13, 2014		0.47				0.47		
July 14, 2014	0.22	0.54				0.47		
July 15, 2014	0.08	0.45	7.54	156.00	122.00	0.47		12.30
July 16, 2014		0.41				0.47	6.50	
July 17, 2014		0.49				0.47	9.80	
July 18, 2014		0.43				0.47	9.80	
July 19, 2014		0.43				0.47		
July 20, 2014		0.29				0.47		
July 21, 2014		0.46				0.47		

July 22, 2014		0.41	7.01	176.00	159.00	0.47	3.20	22.00
July 23, 2014		0.43				0.47	6.50	
July 24, 2014	0.09	0.41				0.47	3.20	
July 25, 2014		0.41				0.47	6.50	
July 26, 2014		0.40				0.47		
July 27, 2014		0.27				0.47		
July 28, 2014		0.43				0.47	6.50	
July 29, 2014		0.40	6.96	188.00	186.00	0.47	3.20	22.80
July 30, 2014		0.40				0.47	3.20	
July 31, 2014		0.40				0.47		
August 1, 2014		0.33				0.47	6.50	
August 2, 2014		0.48				0.47		
August 3, 2014		0.27				0.47		
August 4, 2014		0.52				0.47	6.50	
August 5, 2014		0.39	7.22	132.00	157.00	0.47		29.30
August 6, 2014		0.39				0.47	6.50	
August 7, 2014		0.41				0.47		
August 8, 2014	0.22	0.42				0.47	3.20	
August 9, 2014	0.09	0.40				0.47		
August 10, 2014		0.44				0.47		
August 11, 2014	0.46	0.68				0.47		
August 12, 2014	0.23	0.42	7.56	96.00	158.00	0.47	3.20	21.70
August 13, 2014		0.41				0.47	3.20	
August 14, 2014		0.40				0.47		
August 15, 2014	Filling Pond	0.14				0.47		
August 16, 2014		0.25				0.47		
August 17, 2014	0.64	0.24				0.47		
August 18, 2014		0.46				0.47		
August 19, 2014	0.05	0.41	7.49	104.00	144.00	0.47		17.80
August 20, 2014		0.42				0.47		
August 21, 2014		0.40				0.47		
August 22, 2014		0.40				0.47		
August 23, 2014		0.40				0.47		
August 24, 2014	0.17	0.34				0.47		
August 25, 2014		0.38				0.47	6.20	
August 26, 2014		0.34	7.51	186.00	216.00	0.47		19.80
August 27, 2014		0.35				0.47	6.20	
August 28, 2014		0.48				0.47		
August 29, 2014	0.28	0.47				0.47	9.80	
August 30, 2014		0.75				0.47		
August 31, 2014	0.48	0.52				0.47		
September 1, 2014		0.23				0.47		

September 2, 2014		0.41				0.47		
September 3, 2014		0.39	6.68	240.00	139.00	0.47		19.70
September 4, 2014		0.38				0.47		
September 5, 2014		0.39				0.47		
September 6, 2014		0.38				0.47		
September 7, 2014		0.35				0.47		
September 8, 2014		0.47				0.47	6.50	
September 9, 2014		0.37	7.24	164.00	191.00	0.47	3.20	19.30
September 10, 2014	0.53	0.48				0.47	3.20	
September 11, 2014		0.67				0.47		
September 12, 2014	0.08	0.51				0.47	6.50	
September 13, 2014		0.44				0.47		
September 14, 2014		0.25				0.47		
September 15, 2014		0.40				0.47	4.90	
September 16, 2014		0.39	7.34	136.00	161.00	0.47	4.90	14.80
September 17, 2014		0.39				0.47	3.20	
September 18, 2014		0.39				0.47		
September 19, 2014		0.40				0.47		
September 20, 2014		0.39				0.47		
September 21, 2014	0.74	0.70				0.47		
September 22, 2014		0.40				0.47	6.50	
September 23, 2014		0.40	7.52	156.00	126.00	0.47	3.20	18.70
September 24, 2014		0.39				0.47	6.50	
September 25, 2014		0.38				0.47	3.20	
September 26, 2014		0.39				0.47	3.20	
September 27, 2014		0.43				0.47		
September 28, 2014		0.28				0.47		
September 29, 2014		0.37				0.47		
September 30, 2014		0.38				0.47		
October 1, 2014		0.37	7.62	172.00	166.00	0.47	6.50	13.30
October 2, 2014		0.52				0.47	3.20	
October 3, 2014	0.60	0.46				0.47		
October 4, 2014	0.09	0.38				0.47		
October 5, 2014		0.38				0.47		
October 6, 2014	0.08	0.40				0.47		
October 7, 2014	0.10	0.53	7.93	280.00	263.00	0.47	3.20	8.50
October 8, 2014	0.43	0.46				0.47	3.20	
October 9, 2014	0.10	0.73				0.47	3.20	
October 10, 2014	0.28	0.77				0.47	3.20	
October 11, 2014	0.32	0.62				0.47		
October 12, 2014		0.52				0.47		
October 13, 2014	0.38	1.45				0.47		

October 14, 2014	1.65	1.30	7.76	144.00	52.00	0.47		16.50
October 15, 2014	0.06	0.74				0.47		
October 16, 2014	0.09	0.61				0.47		
October 17, 2014		0.56				0.47		
October 18, 2014		0.47				0.47		
October 19, 2014		0.42				0.47		
October 20, 2014		0.43				0.47	6.50	
October 21, 2014	Trace	0.44	7.67	148.00	149.00	0.47	3.20	18.40
October 22, 2014		0.80				0.47	3.20	
October 23, 2014		0.42				0.47	3.20	
October 24, 2014		0.51				0.47	3.20	
October 25, 2014		0.47				0.47		
October 26, 2014		0.30				0.47		
October 27, 2014		0.42				0.47	3.20	
October 28, 2014		0.90	7.39	228.00	97.00	0.47	3.20	11.90
October 29, 2014	0.65	0.51				0.47	3.20	
October 30, 2014		0.47				0.47	3.20	
October 31, 2014	0.04	0.45				0.47		
November 1, 2014		0.44				0.47		
November 2, 2014		0.42				0.47		
November 3, 2014	Trace	0.73				0.47	3.20	
November 4, 2014		0.84	7.61	196.00	141.00	0.47	3.20	13.90
November 5, 2014	0.53	0.75				0.47	3.20	
November 6, 2014		0.55				0.47	3.20	
November 7, 2014		0.59				0.47	3.20	
November 8, 2014		0.45				0.47		
November 9, 2014	0.10	0.42				0.47		
November 10, 2014		0.56				0.47		
November 11, 2014		0.46	7.34	164.00	134.00	0.47		12.60
November 12, 2014		0.45				0.47		
November 13, 2014		0.43				0.47		
November 14, 2014		0.42				0.47		
November 15, 2014		0.42				0.47		
November 16, 2014	Trace	0.53				0.47		
November 17, 2014	0.47	0.68				0.47		
November 18, 2014		0.50	7.41	152.00	115.00	0.47		22.10
November 19, 2014		0.65				0.47		
November 20, 2014		0.48				0.47		
November 21, 2014		0.51				0.47		
November 22, 2014		0.49				0.47		
November 23, 2014		1.31				0.47		
November 24, 2014	1.43	1.37				0.47		

November 25, 2014		0.79	7.84	80.00	119.00	0.47		5.60
November 26, 2014		0.78				0.47	4.90	
November 27, 2014	0.16	0.69				0.47		
November 28, 2014		0.58				0.47		
November 29, 2014		0.60				0.47		
November 30, 2014		0.77				0.47		
December 1, 2014	0.79	1.40				0.47		
December 2, 2014	0.38	1.54	7.27	48.00	52.00	0.47		3.60
December 3, 2014		0.86				0.47		
December 4, 2014	0.04	0.87				0.47		
December 5, 2014	0.12	1.64				0.47		
December 6, 2014	0.67	1.46				0.47		
December 7, 2014		0.84				0.47		
December 8, 2014		0.85				0.47		
December 9, 2014		0.75	7.72	92.00	73.00	0.47		4.96
December 10, 2014		0.68				0.47	3.20	
December 11, 2014		0.63				0.47	3.20	
December 12, 2014		0.63				0.47		
December 13, 2014		0.56				0.47		
December 14, 2014		0.57				0.47		
December 15, 2014		0.76				0.47		
December 16, 2014	0.21	0.66	7.12	312.00	54.00	0.47		7.40
December 17, 2014		0.61				0.47		
December 18, 2014	0.03	0.59				0.47		
December 19, 2014		0.60				0.47		
December 20, 2014		0.54				0.47		
December 21, 2014		0.55				0.47		
December 22, 2014		0.66				0.47	6.50	
December 23, 2014	0.16	1.05	7.61	116.00	109.00	0.47		12.40
December 24, 2014	0.39	1.24				0.47		
December 25, 2014	0.18	1.12				0.47		
December 26, 2014	Trace	1.13				0.47		
December 27, 2014	0.54	1.38				0.47		
December 28, 2014		1.06				0.47		
December 29, 2014		1.03				0.47		
December 30, 2014		0.92	7.84	224.00	97.00	0.47		11.40
December 31, 2014		0.82				0.47		
	45.71	**0.82**	**7.49**	**156.49**	**126.13**	**0.47**	**465.70**	**13.28**

NAME OF SEWAGE TREATMENT PLANT City of Marion, KY. Crittenden COUNTY MONTH OF January 20 14

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	RAW SLUDGE % DRY SOLIDS	RAW SLUDGE % VOLATILE SOLIDS	PRIMARY DIGESTER(S) TEMPERATURE PH	PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE % SOLIDS	DIGESTED SLUDGE % VOLATILE SOLIDS	DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E COLI/100 ML x	Phosphorus, T	N. Kjeldahl, T	Rain"
	1	0.88																				0.47																											
0.09	2	0.89			7.92	7.96					10.6		256		4				69		4	0.47																									5.01	3.0	21.8	40	0.79	0	
I	3	0.98																				0.47																											
	4	0.90																				0.47																											
0.39	5	1.27																				0.47																											
0.14	6	1.01																				0.47																											
	7	0.90			7.78	7.83					10.3		36		3				98		6	0.47																									5.01	3.2	7.6	26	0.55	0	
	8	0.91																				0.47																											
0.02	9	0.99																				0.47																											
0.01	10	1.46																				0.47																											
0.95	11	1.81																				0.47																											
	12	1.60																				0.47																											
0.03	13	1.64																				0.47		3.2																									
0.12	14	1.43			7.09	7.11					9.3		44		5				74		6	0.47																									5.01	3.4	8.3	71	0.66	0	
0.01	15	1.23																				0.47																											
I	16	1.14																				0.47																											
I	17	1.27																				0.47																											
	18	0.87																				0.47																											
	19	0.99																				0.47																											
	20	0.62																				0.47																											
I	21	0.86			7.64	7.62					10.1		116		5				105		6	0.47																									5.01	3.6	19.4	42	1.62	7	
I	22	0.85																				0.47																											
	23	0.79																				0.47																											
	24	0.93																				0.47																											
I	25	0.80																				0.47																											
	26	0.73																				0.47																											
	27	0.73																				0.47																											
	28	0.72			7.87	7.83					12.8		220		6				120		6	0.47																									5.01	3.9	16.7	1	1.17	11	
	29	0.69																				0.47																											
	30	0.69																				0.47																											
	31	0.84																				0.47																											
	Tot.	31.42											672		23				466		28																										17.1	73.8	GM	4.9	18	
	Avg.	1.01											134		5				93		6	0.47																									5.01	3.4	14.8	20	1.0	3.6	

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION _____ FLOW _____ BOD _____ SS

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

Tim Hodge OPERATOR

5867 CERT. NO.

270-965-2525 PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. | Crittenden COUNTY | MONTH OF February | 20 14

NPDES PERMIT NO. KY0020061 | PLANT CAPACITY 0.66 MGD | RECEIVING STREAM Rush Creek

	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S) TMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E.COLI/100 ML x	Phosphorus, T	Nitrogen, Total
Rain"	1	1.13																				0.47																										
	2	1.36																				0.47																										
1.11	3	1.35																				0.47																										
	4	1.55			7.47	7.55					12.3		108		7				114		7	0.47																								K.01	4.0	13.8	3	0.75	0
0.75	5	1.81																				0.47																										
T	6	1.57																				0.47																										
T	7	1.35																				0.47																										
0.03	8	1.08																				0.47																										
T	9	1.09																				0.47																										
	10	1.05																				0.47																										
	11	0.98			7.62	7.71					12.1		64		6				113		5	0.47																								<.01	3.7	11.3	11	1.09	12
	12	1.01																				0.47																										
	13	1.17																				0.47																										
0.35	14	1.81																				0.47																										
	15	1.45																				0.47																										
	16	1.15																				0.47																										
	17	1.63																				0.47																										
0.25	18	1.76			7.37	7.42					10.1		240		4				183		5	0.47																								K.01	3.91	8.62	5	0.58	11
	19	1.67																				0.47																										
	20	1.60																				0.47																										
0.34	21	1.76																				0.47																										
	22	1.34																				0.47																										
	23	1.05																				0.47																										
	24	1.03																				0.47																										
	25	0.95			7.42	7.28					10.8		60		3				60		5	0.47																								K.01	3.7	12.9	61	0.82	9
T	26	0.93																				0.47																										
	27	0.88																				0.47																										
	28	1.01																				0.47																										
	29																																																	
	30																																																	
	31																																																	
	Tot.	36.52											472		20				470		22																									15.3	46.6	6M	3.3	32
	Avg.	1.30											118		5				118		6	0.47																								K.01	3.8	11.7	10	0.8	8

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET — Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED: _____

FLOW _____ BOD _____ SS _____

Tim Hodge — OPERATOR

5867 — CERT. NO.

270-965-2585 — PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF March 2014

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

Rain"	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S) TEMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: FECOLI/100 ML x	Phosphorus, T	Nitrogen, T
0.78	1	0.99																				0.47																										
	2	0.98																				0.47																										
1.04	3	1.23																				0.47																										
	4	1.20			7.54	7.37					11.0		216		6				73		7	0.47																							<.01	3.81	11.26	9	1.0	1.17
	5	1.23																				0.47																										
	6	1.24																				0.47																										
	7	1.34																				0.47																										
	8	1.28																				0.47																										
	9	1.16																				0.47																										
	10	1.27																				0.47																										
	11	1.24			7.30	7.71					9.1		180		7				280		6	0.47																							<.01	3.59	11.96	1	0.7	0
0.05	12	1.09																				0.47																										
	13	1.02																				0.47																										
	14	1.08																				0.47																										
	15	1.11																				0.47																										
0.27	16	0.93																				0.47																										
0.20	17	1.27																				0.47																										
	18	1.26			7.07	7.85					10.4		224		5				233		3	0.47																							<.01	3.1	20.4	38	1.0	1.63
I	19	1.09																				0.47																										
	20	1.01																				0.47																										
	21	1.03																				0.47																										
	22	0.87																				0.47																										
	23	0.79																				0.47																										
	24	0.84																				0.47	3.2																										
0.01	25	0.79			7.46	7.43					9.8		112		4				52		7	0.47	3.2																							<.01	3.7	11.9	1	1.0	21
I	26	0.77																				0.47	3.2																										
I	27	0.95																				0.47																										
0.56	28	1.81																				0.47																										
0.92	29	1.28																				0.47																										
	30	0.87																				0.47																										
	31	1.25																				0.47																										
	Tot.	34.27											732		22				638		23																								14.2	55.6	6M	3.7	101
	Avg.	1.11											183		5				160		6	0.47																							<.01	3.6	13.9	4	0.9	25

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

_____ FLOW _____ BOD _____ SS

Tim Hodge OPERATOR

5867 CERT. NO.

270-965-2525 PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF April 2014

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

Rain"	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS: PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS: FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN: FINAL	DISSOLVED OXYGEN: STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS: PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS: SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS: PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS: SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD: PRIM. OR SEC. EFFLUENT	5 DAY BOD: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE RETURN: GAL/DAY x1000	ACTIVATED SLUDGE RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE WASTED: GAL. x 1000
	1	1.05			7.53	7.57					9.3		72		3				39		6	0.47		
	2	1.24																				0.47		4.9
1.59	3	1.41																				0.47		
1.58	4	1.36																				0.47		
	5	1.27																				0.47		
	6	1.23																				0.47		
0.08	7	1.27																				0.47		
0.38	8	1.33			7.41	7.49					9.0		300		3				308		5	0.47		
0.59	9	1.30																				0.47		
	10	1.24																				0.47		3.2
	11	1.31																				0.47		3.2
	12	1.26																				0.47		
	13	0.91																				0.47		
1.30	14	1.34																				0.47		
0.34	15	1.31			7.07	7.37					9.7		184		5				161		2	0.47		
	16	1.28																				0.47		
	17	1.28																				0.47		
	18	1.10																				0.47		
	19	1.01																				0.47		
	20	0.92																				0.47		
	21	0.91																				0.47		3.2
0.01	22	0.82			7.36	7.41					9.4		116		3				92		3	0.47		3.2
	23	0.81																				0.47		4.9
	24	0.99																				0.47		3.2
0.80	25	1.25																				0.47		
	26	1.07																				0.47		
	27	1.01																				0.47		
2.21	28	1.40																				0.47		
0.60	29	1.32			7.61	7.78					8.5		260		3				105		2	0.47		
0.13	30	1.28																				0.47		
	31																							
	Tot.	35.26											932		17				705		18			
	Avg.	1.18											186		3				141		4	0.47		

DATE	AERATION BASIN #1 Contact: DISSOLVED OXYGEN Mg/L	#1: MLSS Mg/L x 1000	#1: MLVSS Mg/L x 1000	#1: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	#1: 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	#2: MLSS Mg/L x 1000	#2: MLVSS Mg/L x 1000	#2: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	#2: 60 MIN.	RAW SLUDGE: GALLONS x 1000	RAW SLUDGE: % DRY SOLIDS	RAW SLUDGE: % VOLATILE SOLIDS	PRIMARY DIGESTER(S): TMPERATURE PH	PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE: % SOLIDS	DIGESTED SLUDGE: % VOLATILE SOLIDS	DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: [redacted]E-COLI/100 ML	Phosphorus, T	Nitrogen, T
1																						<.01	3.8	8.0	1	0.7	0
2																											
3																											
4																											
5																											
6																											
7																											
8																						<.01	2.9	9.7	18	0.3	0
9																											
10																											
11																											
12																											
13																											
14																											
15																						<.01	2.4	7.3	12	0.4	0
16																											
17																											
18																											
19																											
20																											
21																											
22																						<.01	1.9	10.9	1	0.6	0
23																											
24	4.5	2.76	2.40	250	220	2.8	4.84	3.68	600	460																	
25																											
26																											
27																											
28																											
29																						<.01	2.2	4.9	7	0.8	26
30																											
31																											
Tot.																							13.2	40.8	GM	2.8	26
Avg.																						<.01	2.6	8.2	4	0.6	5

TOTAL NUMBER OF SEWER CONNECTIONS______ IND. WASTES POP. EQUIV.
SEWER CONNECTIONS______ x ______ = ______ SEWERED POPULATION

FLOW ______ BOD ______ SS ______

Tim Hodge — OPERATOR 5867 — CERT. NO. 270-965-2525 — PLANT TELEPHONE

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water
NON-RESIDENT POULATION EQUIVALENT SERVED:______

NAME OF SEWAGE TREATMENT PLANT City of Marion, KY — Crittenden COUNTY — MONTH OF May 2014

NPDES PERMIT NO. KY0020061 — PLANT CAPACITY 0.66 MGD — RECEIVING STREAM Rush Creek

	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN: GAL/DAY x1000	ACTIVATED SLUDGE: RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED: GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE: % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S): TMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE: % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E-COLI/100 ML x	Phosphorus, Total	Nitrogen, Total
Rain"	1	1.25																				0.47																												
	2	1.18																				0.47																												
	3	6.99																				0.47																												
	4	0.90																				0.47																												
	5	0.84																				0.47	6.5																												
	6	0.82			7.52	7.47					8.3		76	[redacted]	3				96		6	0.47																										[redacted]	<.01	2.54	8.12	14	0.9	0
	7	0.76																				0.47																												
I	8	0.71																				0.47																												
1.24	9	1.22																				0.47																												
	10	1.08																				0.47																												
0.09	11	0.69																				0.47																												
	12	0.83																				0.47																												
0.01	13	0.96			7.52	7.65					8.1		300		3				123		4	0.47																										<.01	3.3	129	1	2.0	0
0.50	14	1.89																				0.47																												
1.51	15	1.80																				0.47																												
0.03	16	1.38																				0.47																												
	17	1.01																				0.47																												
	18	0.88																				0.47																												
	19	0.98																				0.47																												
	20	0.82			7.38	7.84					8.2		164		3				80		3	0.47																										<.01	3.7	108	5	1.6	0
	21	0.78																				0.47	3.2																												
	22	0.80																				0.47	3.2																												
0.18	23	0.83																				0.47																												
	24	0.70																				0.47																												
	25	0.59																				0.47																												
	26	0.53																				0.47																												
1.34	27	1.02			7.71	7.74					8.0		84		3				146		4	0.47																										<.01	2.01	9.9	7	2.0	0
	28	0.99																				0.47																												
	29	0.84																				0.47	6.5																												
	30	1.08																				0.47																												
0.57	31	1.02																				0.47																												
	Tot.	30.17											624		12				445		17																													
	Avg.	0.97											156		3				111		4	0.47																										11.5	41.7	6M	6.5	0
																																															<.01	2.9	10.4	5	1.6	0

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET — Division Of Water — NON-RESIDENT POULATION EQUIVALENT SERVED: _____

FLOW _____ BOD _____ SS _____

Tim Hodge — OPERATOR

5867 — CERT. NO.

270-965-2525 — PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF June 2014

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

Rain:	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW
0.01	1	0.93										
0.13	2	1.19										
1.52	3	1.41			7.75	7.72					8.1	
	4	1.62										
1.10	5	1.87										
T	6	1.61										
	7	1.40										
0.22	8	0.80										
0.02	9	1.07										
0.22	10	1.38			8.02	7.99					7.3	
0.48	11	1.26										
	12	1.07										
	13	1.11										
	14	0.80										
	15	0.73										
	16	0.69										
	17	0.66			7.73	7.74					7.2	
	18	0.61										
	19	0.74										
0.05	20	0.76										
	21	0.52										
	22	0.53										
	23	0.99										
0.67	24	1.01			7.66	7.63					7.2	
0.29	25	0.76										
	26	1.02										
1.78	27	0.87										
0.01	28	0.70										
	29	0.62										
	30	0.61										
	31											
	Tot.	29.34										
	Avg.	0.98										

DATE	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE RETURN: GAL/DAY x1000	ACTIVATED SLUDGE RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE WASTED: GAL. x 1000
1										0.47		
2										0.47		
3	116		5				103		4	0.47		
4										0.47		
5										0.47		
6										0.47		
7										0.47		
8										0.47		
9										0.47		3.2
10	128		6				55		2	0.47		3.2
11										0.47		
12										0.47		
13										0.47		
14										0.47		
15										0.47		
16										0.47		
17	136		2				101		4	0.47		
18										0.47		6.5
19										0.47		6.5
20										0.47		
21										0.47		
22										0.47		
23										0.47		9.8
24	60		2				71		3	0.47		9.8
25										0.47		9.8
26										0.47		19.5
27										0.47		3.2
28										0.47		
29										0.47		
30										0.47		9.8
31												
Tot.	440		15				330		13			
Avg.	110		4				83		3	0.47		

DATE	AERATION BASIN #1 Contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1: MLSS Mg/L x 1000	AERATION BASIN #1: MLVSS Mg/L x 1000	AERATION BASIN #1 SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #1 SETTLED SLUDGE VOL. (ML/L): 60 MIN.	AERATION BASIN #2 Re Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2: MLSS Mg/L x 1000	AERATION BASIN #2: MLVSS Mg/L x 1000	AERATION BASIN #2 SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #2 SETTLED SLUDGE VOL. (ML/L): 60 MIN.
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
Tot.										
Avg.										

DATE	SOLIDS HANDLING – RAW SLUDGE: GALLONS x 1000	RAW SLUDGE: % DRY SOLIDS	RAW SLUDGE: % VOLATILE SOLIDS	PRIMARY DIGESTER(S): TEMPERATURE PH	PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE: % SOLIDS	DIGESTED SLUDGE: % VOLATILE SOLIDS	DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS
1										
2										
3										
4										
5										
6										
7										
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9										
10										
11										
12										
13										
14										
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16										
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18										
19										
20										
21										
22										
23										29.1
24										
25										
26										
27										
28										
29										
30										
31										
Tot.										
Avg.										

DATE	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E-COLI/100 ML	Phosphorus, T	Nitrogen, total
1							
2							
3		<.01	3.1	11.1	30	1.3	0
4							
5							
6							
7							
8							
9							
10		<.01	3.1	12.2	21	1.1	0
11							
12							
13							
14							
15							
16							
17		<.01	3.0	7.8	1	1.7	0
18							
19							
20							
21							
22							
23							
24		<.01	2.6	9.4	23	1.6	0
25							
26							
27							
28							
29							
30							
31							
Tot.			11.8	40.5	GM	5.7	0
Avg.		<.01	2.9	10.1	11	1.4	0

TOTAL NUMBER OF SEWER CONNECTIONS ________ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS ________ x ________ = ________ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED ________

________ FLOW ________ BOD ________ SS

Tim Hodge
OPERATOR

5867
CERT. NO

270-965-2525
PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, ky. Crittenden COUNTY MONTH OF July 20 14

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

Rain:

DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY CBOD Mg/L: RAW	5 DAY CBOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY CBOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	RAW SLUDGE: % DRY SOLIDS	RAW SLUDGE: % VOLATILE SOLIDS	PRIMARY DIGESTER(S): TMPERATURE PH	PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE: % SOLIDS	DIGESTED SLUDGE: % VOLATILE SOLIDS	DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E-COLI/100 ML x	Phosphorus, T	Nitrogen, total
1	0.72			7.34	7.63					7.3		236		2				119		3	0.47		9.8																															
2	0.73																				0.47		9.8																															
3	0.65																				0.47		14.6																															
4	0.65																				0.47																																	
5	0.51																				0.47																																	
6	0.35																				0.47																																	
7	0.50																				0.47		9.8																															
8	0.49			7.63	7.58					7.1		96		4				132		3	0.47		3.2																														4.01	3.96	12.12	11	1.6	0
9	0.59																				0.47		9.8																															
10	0.46																				0.47		9.8																															
11	0.46																				0.47		6.5																															
12	0.53																				0.47																																	
13	0.47																				0.47																																	
14	0.54																				0.47																																	
15	0.45			7.54	7.51					7.1		156		3				122		3	0.47																														4.01	3.1	12.3	1	1.7	0
16	0.41																				0.47		6.5																															
17	0.49																				0.47		9.8																															
18	0.43																				0.47		9.8																															
19	0.43																				0.47																																	
20	0.29																				0.47																																	
21	0.46																				0.47																																	
22	0.41			7.01	7.10					7.2		176		2				159		3	0.47		3.2																														4.01	3.4	22.0	3	1.4	0
23	0.43																				0.47		6.5																															
24	0.41																				0.47		3.3																															
25	0.41																				0.47		6.5																															
26	0.40																				0.47																																	
27	0.27																				0.47																																	
28	0.43																				0.47		6.5																															
29	0.40			6.96	6.91					7.2		188		2				186		4	0.47		3.2																														4.01	3.9	22.8	16	2.0	0
30	0.40																				0.47		3.2																															
31	0.40																				0.47																																	
Tot.	14.47											852		13				718		16																														17.1	80.9	6M	8.0	0
Avg.	0.47											170		3				144		3	0.47																														4.01	3.4	16.2	8	1.6	0

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

FLOW	BOD	SS

Tim Hedge — OPERATOR

5867 — CERT. NO.

270-965-2525 — PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, KY — Crittenden COUNTY — MONTH OF August 2014

NPDES PERMIT NO. KY0020061 — PLANT CAPACITY 0.66 MGD — RECEIVING STREAM Rush Creek

Rain	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS: PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS: FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN: FINAL	DISSOLVED OXYGEN: STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS: PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS: SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS: PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS: SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD: PRIM. OR SEC. EFFLUENT	5 DAY BOD: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE RETURN: GAL/DAY x1000	ACTIVATED SLUDGE RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE WASTED: GAL. x 1000
	1	0.33																				0.47		6.5
	2	0.48																				0.47		
	3	0.27																				0.47		
	4	0.52																				0.47		6.5
	5	0.39			7.22	7.14					7.1		132		3				157		3	0.47		
	6	0.39																				0.47		6.5
	7	0.41																				0.47		
0.22	8	0.42																				0.47		3.2
0.09	9	0.40																				0.47		
	10	0.44																				0.47		
0.46	11	0.68																				0.47		
0.23	12	0.42			7.56	7.34					7.2		96		2				158		3	0.47		3.2
	13	0.41																				0.47		3.2
	14	0.40																				0.47		
Filling pond	15	0.14																				0.47		
	16	0.25																				0.47		
0.64	17	0.24																				0.47		
	18	0.46																				0.47		
0.05	19	0.41			7.49	7.45					7.1		104		2				144		4	0.47		
	20	0.42																				0.47		
	21	0.40																				0.47		
	22	0.40																				0.47		
	23	0.40																				0.47		
0.17	24	0.34																				0.47		
	25	0.38																				0.47		6.2
	26	0.34			7.51	7.43					7.2		186		6				216		3	0.47		
	27	0.35																				0.47		6.2
	28	0.48																				0.47		
0.28	29	0.47																				0.47		9.8
	30	0.75																				0.47		
0.48	31	0.52																				0.47		
	Tot.	12.71											518		13				675		13			
	Avg.	0.41											130		3				169		3	0.47		

DATE	AERATION BASIN #1 Contact: DISSOLVED OXYGEN Mg/L	#1: MLSS Mg/L x 1000	#1: MLVSS Mg/L x 1000	#1: SETTLED SLUDGE VOL. (Ml/L) 30 MIN.	#1: SETTLED SLUDGE VOL. 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	#2: MLSS Mg/L x 1000	#2: MLVSS Mg/L x 1000	#2: SETTLED SLUDGE VOL. (Ml/L) 30 MIN.	#2: SETTLED SLUDGE VOL. 60 MIN.	RAW SLUDGE: GALLONS x 1000	RAW SLUDGE: % DRY SOLIDS	RAW SLUDGE: % VOLATILE SOLIDS	PRIMARY DIGESTER(S): TEMPERATURE PH	PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE: % SOLIDS	DIGESTED SLUDGE: % VOLATILE SOLIDS	DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS
1																				
2																				
3																				
4																				
5																				
6																				
7	1.3	2.65	1.42	230	190	4.7	4.24	2.23	350	290										
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				
21																				
22																				
23																				
24																				
25																				
26																				
27																				
28																			27.7	
29																				
30																				
31																				
Tot.																				
Avg.																				

DATE	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E.COLI/100 ML	Phosphorus, T	Nitrogen, total
1							
2							
3							
4							
5		<.01	2.9	29.3	2	2.9	10
6							
7							
8							
9							
10							
11							
12		<.01	3.1	21.7	17	4.0	10
13							
14							
15							
16							
17							
18							
19		<.01	2.9	17.8	26	2.5	9
20							
21							
22							
23							
24							
25							
26		<.01	2.2	19.8	15	2.4	8
27							
28							
29							
30							
31							
Tot.			11.1	88.6	6M	11.8	17
Avg.		<.01	2.8	22.2	11	2.9	4

TOTAL NUMBER OF SEWER CONNECTIONS ________ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS ________ x ________ = ________ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED ________

FLOW ________ BOD ________ SS ________

Tim Hodge — OPERATOR

5867 — CERT. NO.

270-965-2525 — PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, KY — Crittenden COUNTY — MONTH OF September 20 14

NPDES PERMIT NO. KY0020061 — PLANT CAPACITY 0.66 — MGD RECEIVING STREAM Rush Creek

Rain

DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE: % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S): TMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE: % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E-COLI/100 ML x	Phosphorus, T	Nitrogen, total
1	0.23																				0.47																												
2	0.41																				0.47																												
3	0.39			6.68	7.06					7.3		240		2				139		3	0.47																												
4	0.38																				0.47																												
5	0.39																				0.47																												
6	0.38																				0.47																												
7	0.35																				0.47																												
8	0.47																				0.47		6.5																										
9	0.37			7.24	7.27					7.1		164		2				191		3	0.47		3.2																										
10	0.48																				0.47		3.2																										
11	0.67																				0.47																												
12	0.51																				0.47		6.5																										
13	0.44																				0.47																												
14	0.25																				0.47																												
15	0.40																				0.47		4.9																										
16	0.39			7.34	7.30					7.2		136		2				161		2	0.47		4.9																										
17	0.39																				0.47		3.2																										
18	0.39																				0.47																												
19	0.40																				0.47																												
20	0.39																				0.47																												
21	0.70																				0.47																												
22	0.40																				0.47		6.5																										
23	0.40			7.52	7.27					7.5		156		4				126		2	0.47		3.2																										
24	0.39																				0.47		6.5																										
25	0.38																				0.47		3.2																										
26	0.39																				0.47		3.2																										
27	0.43																				0.47																												
28	0.28																				0.47																												
29	0.37																				0.47																												
30	0.38																				0.47																												
31																																																	
Tot.	12.2											696		10				617		10																												
Avg.	0.41											174		3				154		2	0.47																												

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31																																															
Tot.																																														
Avg.																																															

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

FLOW _____ BOD _____ SS _____

Tim Hodge — OPERATOR

5867 — CERT. NO

270-965-2525 — PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF October 2014

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY CBOD Mg/L: RAW	5 DAY CBOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY CBOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 Contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 Contact: MLSS Mg/L x 1000	AERATION BASIN #1 Contact: MLVSS Mg/L x 1000	AERATION BASIN #1 Contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 Contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	RAW SLUDGE: % DRY SOLIDS	RAW SLUDGE: % VOLATILE SOLIDS	PRIMARY DIGESTER(S): TEMPERATURE PH	PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE: % SOLIDS	DIGESTED SLUDGE: % VOLATILE SOLIDS	DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E-COLI/100 ML x	Phosphorus T	Nitrogen, total
Rain	1	0.37			7.62	7.34					7.4		172		2				166		2	0.47		6.5																											
	2	0.52																				0.47		3.2																											
0.60	3	0.46																				0.47																											
0.09	4	0.38																				0.47																											
	5	0.38																				0.47																											
0.08	6	0.40																				0.47																											
0.10	7	0.53			7.93	7.85					7.5		280		3				263		3	0.47		3.2																											
0.43	8	0.46																				0.47		3.2																									
0.10	9	0.73																				0.47		3.2	5.2	3.68	2.70	430	350	2.9	4.86	3.24	590	460															
0.28	10	0.77																				0.47		3.2																									
0.32	11	0.62																				0.47																											
	12	0.52																				0.47																											
0.38	13	1.45																				0.47																											
1.65	14	1.30			7.76	7.72					7.6		144		3				52		2	0.47																									<.01	2.1	16.5	58	2.3	10
0.06	15	0.74																				0.47																											
0.09	16	0.61																				0.47																											
	17	0.56																				0.47																											
	18	0.47																				0.47																											
	19	0.42																				0.47																											
	20	0.43																				0.47		6.5																											
T	21	0.44			7.67	7.62					7.5		148		1				149		2	OH7		3.2																								<.01	0.9	18.4	1	1.9	10
	22	0.80																				0.47		3.2																											
	23	OH2																				OH7		3.2																											
	24	0.51																				0.47		3.2																											
	25	0.47																				OH7																											
	26	0.30																				0.47																											
	27	0.42																				0.47		3.2																											
	28	0.90			7.39	7.47					7.4		228		2				97		3	OH7		3.2																								<.01	1.31	11.9	1	1.7	10
0.65	29	0.57																				0.47		3.2																											
	30	OH7																				0.47		3.2																											
0.04	31	OH5																				OH7																											
	Tot.	17.81											972		11				727		12																									8.1	68.6	G.M.	9.7	64
	Avg.	0.57											194		2				145		2	0.47																									<.01	1.6	13.7	3	1.9	13

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION _____ FLOW _____ BOD _____ SS

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

Tim Hodge OPERATOR

5867 CERT. NO.

270-965-2525 PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, KY — Crittenden COUNTY — MONTH OF November — 2014

NPDES PERMIT NO. KY0020061 — PLANT CAPACITY 0.66 — MGD RECEIVING STREAM Rush Creek

DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 Contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 Contact: MLSS Mg/L x 1000	AERATION BASIN #1 Contact: MLVSS Mg/L x 1000	AERATION BASIN #1 Contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 Contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S) TEMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E-COLI/100 ML x	Phosphorus, Total	Nitrogen, Total
1	0.44																				0.47																										
2	0.42																				0.47																										
3	0.73																				0.47		3.2																										
4	0.84			7.61	7.64					7.6		196		8				141		3	0.47		3.2																										
5	0.75																				0.47		3.2																										
6	0.55																				0.47		3.2	5.0	3.84	3.42	590	450	2.7	5.12	4.56	780	630														
7	0.59																				0.47		3.2																										
8	0.45																				0.47																										
9	0.42																				0.47																										
10	0.56																				0.47																										
11	0.46			7.34	7.27					7.5		164		7				134		2	0.47																									<.01	0.61	12.6	8	1.2	10
12	0.45																				0.47																										
13	0.43																				0.47																										
14	0.42																				0.47																										
15	0.42																				0.47																										
16	0.53																				0.47																										
17	0.68																				0.47																										
18	0.50			7.41	7.36					7.8		152		2				115		4	0.47																									<.01	0.86	22.1	17	1.5	26
19	0.65																				0.47																										
20	0.48																				0.47																										
21	0.51																				0.47																										
22	0.49																				0.47																										
23	1.31																				0.47																										
24	1.37																				0.47																										
25	0.79			7.84	7.93					16.7		80		3				119		4	0.47																									<.01	0.3	5.6	1	1.6	10
26	0.78																				0.47	4.9																										
27	0.69																				0.47																										
28	0.58																				0.47																										
29	0.60																				0.47																										
30	0.77																				0.47																										
31																																																			
Tot.	18.66											592		20				509		13																																
Avg.	0.62											148		5				127		3	0.47																									<.01	0.5	13.6	3	1.3	9

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET — Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

FLOW _____ BOD _____ SS _____

Tim Hodge — OPERATOR

5867 — CERT. NO.

270-965-2525 — PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF December 20 14

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

Rain"	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY CBOD Mg/L: RAW	5 DAY CBOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY CBOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S) TMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: FECAL COLI/100 ML x	Phosphorus / Nitrogen, total
0.79	1	1.40																				047																								
0.38	2	1.54			7.27	7.31					10.1		48		2				52		4	0.47																					<.01	0.1	3.6	67	1.2 / 24
	3	0.86																				0.47																								
0.04	4	0.87																				0.47																								
0.12	5	1.64																				0.47																								
0.67	6	1.46																				0.47																								
	7	0.84																				047																								
	8	0.86																				0.47																								
	9	0.75			7.22	7.98					10.6		92		3				73		4	0.47																					<.01	1.07	4.96	1	1.9 / 0
	10	0.68																				047	3.2																							
	11	0.63																				0.47	3.2																							
	12	0.63																				0.47																								
	13	0.56																				047																								
	14	0.57																				0.47																								
	15	0.76																				047																								
0.21	16	0.66			7.12	7.24					10.0		312		7				54		3	0.47																					<.01	0.4	7.4	12	1.6 / 0
	17	0.61																				047																								
0.03	18	0.54																				047																								
	19	0.60																				0.47																								
	20	0.54																				0.47																								
	21	0.55																				0.47																								
	22	0.66																				0.47	6.5																							
0.16	23	1.05			7.61	7.69					9.8		116		5				109		4	0.47																					<.01	0.7	12.4	15	1.3 / 0
0.39	24	1.24									1											047																								
0.18	25	1.12																				0.47																								
T	26	1.13																				0.47																								
0.54	27	1.38																				047																								
	28	1.06																				0.47																								
	29	1.03																				0.47																								
	30	0.92			7.84	7.76					10.9		224		5				97		4	0.47																					<.01	0.7	11.4	11	1.7 / 0
	31	0.82																				0.47																								
	Tot.	28.0											792		22				335		19																						3.0	39.8	6m	7.7 / 24
	Avg.	0.90											158		4				77		4	0.47																					<.01	0.6	8.0	11	1.5 / 5

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET

Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

_____ FLOW _____ BOD _____ SS

Tim Hodge OPERATOR

5867 CERT. NO

270-965-2525 PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky   Crittenden COUNTY   MONTH OF January 2015

NPDES PERMIT NO. KY0020061   PLANT CAPACITY 0.66 MGD   RECEIVING STREAM Rush Creek

Rain"	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000
	1	0.73																				0.47		
T	2	0.81																				0.47		
0.22	3	1.79																				0.47		
1.04	4	1.71																				0.47		
0.01	5	1.25			7.71	7.75					11.4		0		0				34		8	0.47		
	6	1.05																				0.47		
T	7	0.90																				0.47		
	8	0.84																				0.47		
	9	0.89																				0.47		
	10	0.68																				0.47		
	11	0.66																				0.47		
0.38	12	1.23			7.67	7.62					11.8		78		5				74		6	0.47		
T	13	0.93																				0.47		
	14	0.89																				0.47		
T	15	0.89																				0.47		
0.08	16	0.87																				0.47		
	17	0.78																				0.47		
0.01	18	0.79																				0.47		
	19	0.71			7.58	7.61					11.9		120		7				66		7	0.47		
	20	0.71																				0.47		
	21	0.67																				0.47		3.2
	22	0.65																				0.47		
	23	0.82																				0.47		3.2
	24	0.79																				0.47		
	25	0.98																				0.47		
0.64	26	1.21																				0.47		
	27	0.99																				0.47		
	28	0.90			7.72	7.84					11.8		68		<5				65		<5	0.47		
	29	0.84																				0.47		
	30	0.75																				0.47		
	31	0.76																				0.47		
	Tot.	28.48											266		17				239		26			
	Avg.	0.92											89		6				60		6	0.47		

DATE	AERATION BASIN #1 Contact: DISSOLVED OXYGEN Mg/L	#1: MLSS Mg/L x 1000	#1: MLVSS Mg/L x 1000	#1: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	#1: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	#2: MLSS Mg/L x 1000	#2: MLVSS Mg/L x 1000	#2: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	#2: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	RAW SLUDGE: % DRY SOLIDS	RAW SLUDGE: % VOLATILE SOLIDS	PRIMARY DIGESTER(S): TMPERATURE PH	PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE: % SOLIDS	DIGESTED SLUDGE: % VOLATILE SOLIDS	DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				
21																				
22																				
23																				
24																				
25																				
26																				
27																				
28																				
29																				
30																				
31																				
Tot.																				
Avg.																				

DATE	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: FECAL COLI/100 ML x	Phosphorus, T	Nitrogen, total
1							
2							
3							
4							
5		<.01	2.2			1.7	0.95
6					1203		
7					32		
8							
9							
10							
11							
12		<.01	4.0			1.1	0.75
13					285		
14					47		
15							
16							
17							
18							
19		<.01	5.7			1.5	0.93
20					11.0		
21							
22							
23							
24							
25							
26							
27							
28		<.01	3.2			1.3	1.0
29					285		
30							
31							
Tot.			15.1		GM	5.6	3.5
Avg.		<.01	3.8		108	1.4	0.9

TOTAL NUMBER OF SEWER CONNECTIONS ________ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS ________ x ________ = ________ SEWERED POPULATION

________ FLOW ________ BOD ________ SS

Tim Hodge
OPERATOR

5867
CERT. NO

270-965-2525
PLANT TELEPHONE

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED ________

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky Crittenden COUNTY MONTH OF February 20 15

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

Rain	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE GRIT REMOVED (CUBIC FEET)	RAW SEWAGE SCREENINGS (CUBIC FEET)	pH RAW	pH FINAL	SETTLEABLE SOLIDS (Ml/L) RAW	SETTLEABLE SOLIDS PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS FINAL	DISSOLVED OXYGEN (Mg/L) STREAM ABOVE	DISSOLVED OXYGEN FINAL	DISSOLVED OXYGEN STREAM BELOW	SUSPENDED SOLIDS (Mg/L) RAW	SUSPENDED SOLIDS PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L) RAW	TOTAL SOLIDS PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L RAW	5 DAY BOD PRIM. OR SEC. EFFLUENT	5 DAY BOD SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE RETURN GAL/DAY x1000	ACTIVATED SLUDGE RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE WASTED GAL. x 1000
0.11	1	1.55																				0.47		
0.80	2	1.63																				0.47		
	3	1.19																				0.47		
	4	1.03			7.72	7.78					11.6		101		<5				57		<5	0.47		
T	5	0.90																				0.47		
	6	0.99																				0.47		
	7	1.02																				0.47		
	8	0.50																				0.47		
	9	0.75			7.67	7.73					10.2		193		<5				78		<5	0.47		
	10	0.74																				0.47		
	11	0.70																				0.47		
T	12	0.64																				0.47		
T	13	0.64																				0.47		
	14	0.61																				0.47		
T	15	0.58																				0.47		
0.50	16	0.59																				0.47		
0.70	17	0.64																				0.47		
0.10	18	0.57			7.85	7.75					11.4		134		6				120		10	0.47		
	19	0.60																				0.47		
	20	1.07																				0.47		
1.60	21	2.15																				0.47		
	22	1.18																				0.47		
	23	1.73																				0.47		
	24	1.53																				0.47		
	25	1.40			8.09	8.02					12.7		66		8				51		7	0.47		
	26	1.18																				0.47		
T	27	1.13																				0.47		
	28	1.06																				0.47		
	29																							
	30																							
	31																							
	Tot.	28.3											494		24				366		27			
	Avg.	1.01											124		6				77		7	0.47		

DATE	AERATION #1 BASIN Contact DISSOLVED OXYGEN Mg/L	AERATION #1 MLSS Mg/L x 1000	AERATION #1 MLVSS Mg/L x 1000	AERATION #1 SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION #1 SETTLED SLUDGE VOL. 60 MIN.	AERATION #2 BASIN Re-Air DISSOLVED OXYGEN Mg/L	AERATION #2 MLSS Mg/L x 1000	AERATION #2 MLVSS Mg/L x 1000	AERATION #2 SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION #2 SETTLED SLUDGE VOL. 60 MIN.	SOLIDS HANDLING RAW SLUDGE GALLONS x 1000	RAW SLUDGE % DRY SOLIDS	RAW SLUDGE % VOLATILE SOLIDS	PRIMARY DIGESTER(S) TMPERATURE PH	PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE % SOLIDS	DIGESTED SLUDGE % VOLATILE SOLIDS	DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL CHLORINE RESIDUAL (Mg/L)	FINAL FINAL	FINAL NH3-N Mg/L	FINAL NH3-N Mg/L RAW	FINAL E.COLI/100 ML x	Phosphorus Total	Nitrogen, Total
1																											
2																											
3																											
4																						<.01	2.2		1230	0.90	<0.75
5																											
6																											
7																											
8																											
9																						<.01	1.9		37	0.98	<0.75
10																											
11																											
12																											
13																											
14																											
15																											
16																											
17																											
18																						<.01	1.4		921	0.53	<0.75
19																									17.3		
20																											
21																											
22																											
23																											
24																											
25																						<.01	3.6		9.7	0.96	<0.75
26																											
27																											
28																											
29																											
30																											
31																											
Tot.																							9.1		6M	3.37	
Avg.																						<.01	2.3		235	0.84	<0.75

TOTAL NUMBER OF SEWER CONNECTIONS ______ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS ______ x ______ = ______ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED ______

FLOW ______ BOD ______ SS ______

Tim Hodge
OPERATOR

5867
CERT. NO.

270-965-2525
PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky — Crittenden COUNTY — MONTH OF March 2015

NPDES PERMIT NO. KY0020061 — PLANT CAPACITY 0.66 — MGD RECEIVING STREAM Rush Creek

Rain"	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN: GAL/DAY x1000	ACTIVATED SLUDGE: RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED: GAL. x 1000	AERATION BASIN: DISSOLVED OXYGEN Mg/L	AERATION BASIN: MLSS Mg/L x 1000	AERATION BASIN: MLVSS Mg/L x 1000	AERATION BASIN: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	AERATION BASIN: DISSOLVED OXYGEN Mg/L	AERATION BASIN: MLSS Mg/L x 1000	AERATION BASIN: MLVSS Mg/L x 1000	AERATION BASIN: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE: % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S): TMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE: % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: ECOLI/100 ML x	Phosphorus, T	Nitrogen, total
	1	1.56																				0.47																											
0.03	2	1.79			7.91	7.93					12.3		152		6				58		5	0.47																									<0.01	2.6		100.8	0.180	<0.75
T	3	1.88																				0.47																											
1.92	4	1.92																				0.47																											
1.10	5	1.52																				0.47																											
	6	1.16																				0.47																											
	7	1.85																				0.47																											
	8	1.06																				0.47																											
	9	1.74																				0.47																											
0.143	10	1.83																				0.47																											
0.150	11	1.81			6.67	7.62					10.6		1310		7				300		65	0.47																									<0.01	1.8		16.1	0.198	<0.75
	12	1.176																				0.47																											
0.18	13	1.77																				0.47																											
2.05	14	1.69																				0.47																											
0.03	15	1.69																				0.47																											
	16	1.68			7.14	7.81					9.5		123		<5				65		11	0.47																									<0.01	2.7		11.9	1.3	<0.75
	17	1.29																				0.47																											
	18	1.13																				0.47																											
0.04	19	1.12																				0.47																											
0.107	20	0.93																				0.47																											
	21	1.21																				0.47																											
	22	0.73																				0.47																											
	23	0.84			7.84	7.78					10.2		94		5				56		5.2	0.47																									<0.01	6.9		<1.0	1.15	<0.75
	24	0.67																				0.47	6.5																											
	25	0.93																				0.47																											
0.68	26	1.65																				0.47																											
0.09	27	1.29																				0.47																											
	28	0.97																				0.47																											
	29	0.88																				0.47																											
	30	0.86			2.87	2.91					10.2		179		<5				67		<5	0.47																									<0.01	6.5		21.8	1.3	<0.75
	31	0.81																				0.47																											
	Tot.	42.02											1858		28				549		32																										20.5		6M	5.9	
	Avg.	1.36											372		6				110		6	0.47																									<0.01	4.1		13	1.12	<0.75

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV. _____

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION _____ + _____ = _____

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET — Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

FLOW _____ BOD _____ SS _____

Tim Hodge — OPERATOR

5867 — CERT. NO

270-965-2525 — PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. — Crittenden COUNTY — **MONTH OF** April 2015

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

Rain	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS: PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS: FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN: FINAL	DISSOLVED OXYGEN: STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS: PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS: SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS: PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS: SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD: PRIM. OR SEC. EFFLUENT	5 DAY BOD: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE RETURN: GAL/DAY x1000	ACTIVATED SLUDGE RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE WASTED: GAL. x 1000
	1	0.78																				0.47		
0.30	2	1.70																				0.47		
0.10	3	1.94																				0.47		
	4	1.61																				0.47		
	5	1.09																				0.47		
0.24	6	1.37			7.81	7.72					9.7		20		<5				24		<13	0.47		
	7	1.40																				0.47		
	8	1.20																				0.47		
	9	1.16																				0.47		
0.24	10	1.18																				0.47		
	11	0.97																				0.47		
	12	0.85																				0.47		
	13	1.25			7.64	7.75					8.4		90		6				54		<8.3	0.47		
2.11	14	1.87																				0.47		
0.06	15	1.69																				0.47		
0.08	16	1.42																				0.47		
	17	1.31																				0.47		
	18	1.41																				0.47		
0.37	19	1.18																				0.47		
0.37	20	1.66			7.45	8.20					7.7		681		<5				120		<5	0.47		
T	21	1.50																				0.47		
0.22	22	1.32																				0.47		
	23	1.07																				0.47		
	24	0.99																				0.47		
	25	1.30																				0.47		
1.14	26	1.67																				0.47		
	27	1.37			8.19	8.18					8.0		90		5				41		<5	0.47		
	28	1.09																				0.47		
	29	0.97																				0.47		3.2
	30	0.89																				0.47		3.2
	31																							
	Tot.	39.21											881		21				239		31			
	Avg.	1.31											220		5				60		8	0.47		

DATE	AERATION BASIN #1 Contact: DISSOLVED OXYGEN Mg/L	#1: MLSS Mg/L x 1000	#1: MLVSS Mg/L x 1000	#1: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	#1: 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	#2: MLSS Mg/L x 1000	#2: MLVSS Mg/L x 1000	#2: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	#2: 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	RAW SLUDGE: % DRY SOLIDS	RAW SLUDGE: % VOLATILE SOLIDS	PRIMARY DIGESTER(S): TMPERATURE PH	PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE: % SOLIDS	DIGESTED SLUDGE: % VOLATILE SOLIDS	DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				
21																				
22																				
23																				
24																				
25																				
26																				
27																				
28																				
29																				
30																				
31																				
Tot.																				
Avg.																				

DATE	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E. COLI/100 ML	Phosphorus, T	Nitrogen, total
1							
2							
3							
4							
5							
6		<0.1	4.5		84.5	1.4	<0.75
7							
8							
9							
10							
11							
12							
13		<0.1	8.1		1299.7	1.9	<0.75
14							
15							
16							
17							
18							
19							
20		<0.1	3.9		4.1	1.0	<0.75
21							
22							
23							
24							
25							
26							
27		<0.1	4.5		1.0	0.9	<0.75
28							
29							
30							
31							
Tot.			210		6M	5.2	
Avg.		<0.1	5.2		26	1.3	<0.75

TOTAL NUMBER OF SEWER CONNECTIONS ______ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS ______ x ______ = ______ SEWERED POPULATION

______ FLOW ______ BOD ______ SS

Tim Hodge — OPERATOR

5867 — CERT. NO.

270-965-2525 — PLANT TELEPHONE

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED ______

NAME OF SEWAGE TREATMENT PLANT City of Marion — Crittenden COUNTY — MONTH OF May 2015

NPDES PERMIT NO. KY0020061 — PLANT CAPACITY 0.66 MGD — RECEIVING STREAM Rush Creek

Rain	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS: PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS: FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN: FINAL	DISSOLVED OXYGEN: STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS: PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS: SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS: PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS: SEC. EFFLUENT OR FINAL	5 DAY CBOD Mg/L: RAW	5 DAY CBOD: PRIM. OR SEC. EFFLUENT	5 DAY CBOD: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000
	1	0.82																				0.47		
	2	0.77																				0.47		
	3	0.62																				0.47		
	4	0.68																				0.47		
	5	0.65			7.52	7.82		—			7.7		249		9				150		5	0.47		
	6	0.60																				0.47		6.5
	7	0.58																				0.47		
	8	0.60																				0.47		
0.10	9	0.56																				0.47		
T	10	0.55																				0.47		
0.05	11	0.58																				0.47		
	12	0.51			8.00	8.00					7.5		273		27				140		<5	0.47		
	13	0.48																				0.47		
	14	0.45																				0.47		
0.82	15	0.50																				0.47		
0.30	16	0.61																				0.47		
	17	0.30																				0.40		
0.20	18	1.01																				0.47		
0.20	19	0.69			7.88	7.95					7.2		173		<5				87		7.6	0.47		
	20	1.20																				0.47		
0.68	21	1.05																				0.47		
	22	0.78																				0.47		
	23	0.62																				0.47		
	24	0.88																				0.47		
0.54	25	1.04																				0.47		
	26	0.78			8.03	7.86					7.3		105		6				64		<5	0.47		
T	27	0.67																				0.47		
T	28	0.61																				0.47		3.2
	29	0.81																				0.47		
0.38	30	0.80																				0.47		
	31	1.02																				0.47		
	Tot.	21.82											800		47				441		23			
	Avg.	0.70											200		12				110		6	0.47		

DATE	AERATION BASIN #1 Contact: DISSOLVED OXYGEN Mg/L	#1: MLSS Mg/L x 1000	#1: MLVSS Mg/L x 1000	#1: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	#1: SETTLED SLUDGE VOL. 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	#2: MLSS Mg/L x 1000	#2: MLVSS Mg/L x 1000	#2: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	#2: SETTLED SLUDGE VOL. 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	RAW SLUDGE % DRY SOLIDS	RAW SLUDGE % VOLATILE SOLIDS	PRIMARY DIGESTER(S) TMPERATURE PH	PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE % SOLIDS	DIGESTED SLUDGE % VOLATILE SOLIDS	DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE SLUDGE CAKE % SOLIDS
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				
21																				
22																				
23																				
24																				
25																				
26																				
27																				
28																				
29																				
30																				
31																				
Tot.																				
Avg.																				

DATE	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL	NH3-N Mg/L	NH3-N Mg/L RAW	E.COLI/100 ML	Phosphorus, T	Nitrogen, total
5		<.01	13		1	1.6	<0.75
12		<.01	20		7.5	3.1	<0.75
19		<.01	15		1.0	4.9	<0.75
27		<.01	11		11.0	2.2	<0.75
Tot.			59		GM	11.8	
Avg.		<.01	14.7		1	2.9	<0.75

TOTAL NUMBER OF SEWER CONNECTIONS ________ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS ______ x ______ = ______ SEWERED POPULATION ______ FLOW ______ BOD ______ SS

Tim Hodge — OPERATOR | 5867 — CERT. NO | 270-965-2525 — PLANT TELEPHONE

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water
NON-RESIDENT POULATION EQUIVALENT SERVED ______

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF June 20 15

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY CBOD Mg/L: RAW	5 DAY CBOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY CBOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	RAW SLUDGE % DRY SOLIDS	RAW SLUDGE % VOLATILE SOLIDS	PRIMARY DIGESTER(S) TMPERATURE PH	PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE % SOLIDS	DIGESTED SLUDGE % VOLATILE SOLIDS	DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E.COLI/100 ML	Phosphorus, T	Nitrogen, total
Rain:																																																	
0.15	1	0.75			7.70	7.64					7.1		153		<5				85		<5	0.47																						<.01	15		2	1.4	<0.75
0.02	2	0.61																				0.47																											
	3	0.55																				0.47		6.5																									
	4	0.52																				0.47		3.2																									
	5	0.50																				0.47		3.2																									
	6	0.46																				0.47																											
	7	0.43																				0.47																											
	8	0.51			7.35	7.41					7.2		163		6				160		7.2	0.47																						<.01	16		47	2.5	<0.75
0.07	9	0.69																				0.47		6.5																									
	10	0.46																				0.47																											
	11	0.44																				0.47		3.2																									
	12	0.47																				0.47		3.2																									
0.67	13	0.91																				0.47																											
	14	0.33																				0.47																											
	15	0.52			7.26	7.01					7.5		43		<5				41		<5	0.47																						<.01	11		34	2.9	<0.75
T	16	0.79																				0.47																											
1.16	17	1.00																				0.47																											
0.05	18	0.60																				0.47																											
0.04	19	1.48																				0.47																											
2.10	20	1.67																				0.47																											
0.01	21	1.03																				0.47																											
	22	0.81			7.46	7.47					7.1		51		<5				47		<5	0.47																						<.01	4.9		7	2.0	<0.75
	23	0.69																				0.47																											
	24	0.61																				0.47																											
	25	0.58																				0.47		6.5																									
0.12	26	0.72																				0.47																											
	27	0.65																				0.47																											
	28	0.21																				0.47																											
	29	0.48			7.52	7.34					7.2		126		9				130		7.3	0.47																						<.01	5.0		5	2.2	<0.75
	30	0.75																				0.47		6.5																									
	31																																																
	Tot.	20.42											536		27				463		29																								51.9		GM	11.0		
	Avg.	0.68											107		5				93		6	0.47																						<.01	10.4		10	2.2	<0.75

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

_____ FLOW _____ BOD _____ SS

Tim Hodge OPERATOR

5867 CERT. NO

270-965-2525 PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF July 2015

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN: GAL/DAY x1000	ACTIVATED SLUDGE: RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED: GAL. x 1000	AERATION BASIN #1 Contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 Contact: MLSS Mg/L x 1000	AERATION BASIN #1 Contact: MLVSS Mg/L x 1000	AERATION BASIN #1 Contact: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #1 Contact: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE: % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S): TEMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE: % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: FECAL COLI/100 ML x	Phosphorus, T	Nitrogen, total
Rain: T	1	0.65																				0.47		32																								
1.43	2	1.38																				0.47																								
0.05	3	1.17																				0.47																								
0.41	4	0.81																				0.47																								
	5	0.62																				0.47																								
	6	0.63			7.35	7.15					7.3		132		<5				90		<5	0.47																						<.01	5.7		6.2	3.3	<0.75
1.60	7	1.93																				0.47																								
0.35	8	1.74																				0.47																								
1.18	9	1.84																				0.47																								
0.21	10	1.76																				0.47																								
0.06	11	1.28																				0.47																								
	12	0.67																				0.47																								
	13	0.81			7.46	7.43					7.0		68		<5				54		<5	0.47																						<.01	4.7		2	2.0	<0.75
	14	0.74																				0.47																								
	15	0.64																				0.47		6.5																								
	16	0.60																				0.47																								
	17	0.57																				0.47		6.5																								
	18	0.53																				0.47																								
	19	0.59																				0.47																								
0.48	20	1.23			7.14	7.26					7.2		118		5				66		<5	0.47																						<.01	3.5		2	1.2	<0.75
0.56	21	0.95																				0.47																								
	22	0.67																				0.47																								
0.03	23	0.61																				0.47																								
	24	0.58																				0.47		3.2																								
	25	0.55																				0.47																								
1.34	26	0.63																				0.47																								
1.67	27	1.49			7.26	7.31					7.1		47		<5				20		<5	0.47																						<.01	3.8		735 2	0.75	<0.75
1.32	28	1.61																				0.47																								
	29	1.62																				0.47																								
	30	1.12																				0.47																								
	31	0.85																				0.47																								
	Tot.	30.87											365		20				230		20																							17.7		6M	7.2	<0.75
	Avg.	1.00											91		5				58		5	0.47																						<.01	4.4		10	1.8	<0.75

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION _____ _____ _____

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET — Division Of Water — NON-RESIDENT POULATION EQUIVALENT SERVED _____ FLOW BOD SS

Tim Hodge OPERATOR 5867 CERT. NO. 270-965-2525 PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF August 2015

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

Rain	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY CBOD Mg/L: RAW	5 DAY CBOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY CBOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S) TEMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: FECAL COLI/100 ML x [illegible]	Phosphorus, T	Nitrogen, total
	1	0.75																				0.47																										
	2	0.66																				0.47																										
	3	0.64			7.07	7.02					7.3		118		6				57		<5	0.47																				<0.1	5.8		1	1.5	<0.75
	4	0.96																				0.47																										
0.58	5	1.68																				0.47	6.5																								
1.35	6	1.70																				0.47																										
0.07	7	1.48																				0.47																										
	8	0.96																				0.47																										
	9	0.66																				0.47																										
0.12	10	1.10			7.45	7.47					7.4		136		<5				71		<5	0.47																				<0.1	3.5		<1	1.1	1.0
0.32	11	1.01																				0.47																										
	12	0.78																				0.47																										
	13	0.81																				0.47	3.2																								
	14	0.64																				0.47	3.2																								
	15	0.61																				0.47																										
	16	0.61																				0.47																										
	17	0.58			7.08	7.10					7.1		170		<5				110		<5	0.47																				<0.1	3.7		5.2	1.2	0.81
0.19	18	0.76																				0.47	6.5																								
1.22	19	1.86																				0.47																										
0.85	20	1.40																				0.47																										
	21	0.92																				0.47																										
	22	1.27																				0.47																										
	23	0.32																				0.47																										
	24	0.64			6.84	7.07					7.2		84		5				67		5	0.47																				<0.1	4.5		5.2	7.1	1.2
	25	0.60																				0.47	3.2																								
	26	0.57																				0.47	3.2																								
	27	0.56																				0.47																										
	28	0.54																				0.47																										
	29	0.52																				0.47																										
T	30	0.48																				0.47																										
	31	0.49			7.32	7.45					7.1		283		<5				140		8.9	0.47																				<0.1	2.6		3.0	1.7	2.0
	Tot.	26.56											791		26				445		29																					19.5		GM	12.6	5.7
	Avg.	0.86											158		5				89		6																				<0.1	3.9		2	2.5	1.1

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

_____ FLOW _____ BOD _____ SS

Tim Hodge OPERATOR

5867 CERT. NO.

270-965-2525 PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF September 2015

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN: GAL/DAY x1000	ACTIVATED SLUDGE: RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED: GAL. x 1000	AERATION BASIN #1 Contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 Contact: MLSS Mg/L x 1000	AERATION BASIN #1 Contact: MLVSS Mg/L x 1000	AERATION BASIN #1 Contact: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #1 Contact: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE: % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S): TEMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE: % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: FECAL COLI/100 ML x	Phosphorus, T	Nitrogen, total
Rain 1	0.47																				0.47																										
2	0.47																				0.47		3.2																								
3	0.46																				0.47		3.2																								
4	0.49																				0.47		3.2																								
5	0.43																				0.47																										
6	0.49																				0.47																										
7	0.35																				0.47																										
8	0.44			7.14	7.02					7.2		146		<5				130		<5	0.47																								5.01	2.5		6.3	2.2	1.5
9	0.69																				0.47																										
10	0.81																				0.47		3.2																								
11	0.80																				0.47		3.2																								
12	0.56																				0.47																										
13	0.51																				0.47																										
14	0.52																				0.47																										
15	0.50			7.41	7.23					7.3		144		<5				120		<5	0.47																								5.01	2.2		1.0	2.0	2.9
16	0.43																				0.47		3.2																								
17	0.51																				0.47		3.2																								
18	0.51																				0.47																										
19	0.69																				0.47																										
20	0.23																				0.47																										
21	0.48																				0.47																										
22	0.45			7.18	7.19					7.2		185		<5				150		<5	0.47		3.2																						5.01	1.8		1.0	2.0	3.1
23	0.46																				0.47		3.2																								
24	0.46																				0.47		3.2																								
25	0.44																				0.47																										
26	0.44																				0.47																										
27	0.43																				0.47																										
28	0.55			7.16	7.17					7.1		213		<5				170		<5	0.47																										
29	1.26																				0.47																										
30	0.74																				0.47																										
31																																																	
Tot.	16.05											688		<20				570		<20																									7.7		6M	8.6	10.4
Avg.	0.54											172		<5				143		<5	0.47																								5.01	1.9		4	2.1	2.6

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION _____ _____ _____

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET — FLOW BOD SS

Division Of Water — NON-RESIDENT POULATION EQUIVALENT SERVED _____

Tim Hodge — OPERATOR

5867 — CERT. NO

270-965-2525 — PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, KY. Crittenden COUNTY MONTH OF October 2015

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN: GAL/DAY x1000	ACTIVATED SLUDGE: RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED: GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE: % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S): TEMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE: % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: FECAL COLI/100 ML x 1000	Phosphorus, T	Nitrogen, total
Rain:	1	0.54																				0.47																								
1	2	0.63																				0.47																								
	3	0.84																				0.47																								
	4	0.35																				0.47																								
	5	0.50			7.07	7.02					7.2		162		8				140		<5	0.47																					<.01	1.1		16.9	3.0	4.7
	6	0.49																				0.47																								
	7	0.48																				0.47	3.2																								
	8	0.48																				0.47	3.2																								
	9	0.54																				0.47																								
0.10	10	0.45																				0.47																								
	11	0.42																				0.47																								
	12	0.47			7.20	7.14					7.3		152		<5				160		<5	0.47																					<.01	1.1		2.0	2.0	4.1
0.10	13	0.46																				0.47	3.2																								
	14	0.44																				0.47	3.2																								
	15	0.44																				0.47	3.2																								
	16	0.45																				0.47																								
	17	0.56																				0.47																								
	18	0.25																				0.47																								
	19	0.44			7.35	7.03					8.0		168		<5				190		<5	0.47																					<.01	0.9		2.0	2.0	6.4
	20	0.44																				0.47	3.2																								
	21	0.43																				0.47	4.9																								
	22	0.44																				0.47	4.9																								
	23	0.46																				0.47																								
0.01	24	0.55																				0.47																								
0.26	25	0.43																				0.47																								
	26	0.80			7.07	7.71					8.1		220		7				180		9.5	0.47																					<.01	0.9		36.4	3.2	3.9
0.66	27	1.94																				0.47																								
2.12	28	1.78																				0.47																								
	29	1.01																				0.47																								
I	30	0.94																				0.47																								
	31	0.88																				0.47																								
	Tot.	19.33											709		25				670		24																						4.0		GM	10.2	19.1
	Avg.	0.62											177		6				168		6	0.47																					<.01	1.0		7	2.5	4.8

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION _____ _____ _____

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET — FLOW BOD SS

Division Of Water NON-RESIDENT POULATION EQUIVALENT SERVED _____

Tim Hodge — OPERATOR

5867 — CERT. NO

270-965-2525 — PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF November 2015

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S) TEMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E.COLI/100 ML x	Phosphorus, T	Nitrogen, total
Rain	1	0.69																				0.47																										
	2	0.72			7.48	7.88					7.8		93		<5				67		<5	0.47																							<.01	0.33		9.6	1.0	2.2
	3	0.68																				0.47																										
	4	0.67																				0.47																										
	5	0.97																				0.47																										
1.29	6	1.72																				0.47																										
	7	1.18																				0.47																										
	8	0.92																				0.47																										
	9	0.83			7.43	7.50					8.4		66		5				59		<5	0.47																							<.01	0.85		1.0	2.3	2.8
	10	0.77																				0.47																										
	11	1.14																				0.47																										
0.59	12	1.16																				0.47																										
	13	1.04																				0.47																										
	14	0.89																				0.47																										
	15	0.50																				0.47																										
1.49	16	1.17			7.45	7.62					8.2		135		<5				74		<5	0.47																							<.01	0.25	24.6	0.7	<0.75	
1.31	17	2.06																				0.47																										
	18	2.04																				0.47																										
	19	1.64																				0.47																										
	20	1.31																				0.47																										
	21	1.28																				0.47																										
0.22	22	1.08																				0.47																										
	23	0.99			7.82	7.98					8.5		65		5				54		8.1	0.47																							<.01	4.4	3.1	1.9	<0.75	
	24	0.93																				0.47																										
	25	0.91																				0.47																										
	26	0.87																				0.47																										
1.40	27	1.59																				0.47																										
0.62	28	2.36																				0.47																										
0.20	29	1.28																				0.47																										
	30	1.92			7.87	7.94					8.4		102		12				33		5.9	0.47																							<.01	0.97		24.3	0.9	1.5
	31																																																
	Tot.	35.31											461		22				287		14																								6.9		GM	6.8	6.5	
	Avg.	1.18											92		4				57		3	0.47																							<.01	1.4		18	1.4	1.3

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET

Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

_____ FLOW _____ BOD _____ SS

Tim Hodge OPERATOR

5867 CERT. NO

270-965-2525 PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF December 2015

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN: GAL/DAY x1000	ACTIVATED SLUDGE: RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED: GAL. x 1000	AERATION BASIN: DISSOLVED OXYGEN Mg/L	AERATION BASIN: MLSS Mg/L x 1000	AERATION BASIN: MLVSS Mg/L x 1000	AERATION BASIN: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	AERATION BASIN: DISSOLVED OXYGEN Mg/L	AERATION BASIN: MLSS Mg/L x 1000	AERATION BASIN: MLVSS Mg/L x 1000	AERATION BASIN: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE: % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S): TMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE: % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: FECOL/100 ML x	Phosphorus, T	nitrogen, total
Rain 0.20 I	1	1.90																				0.47																											
	2	1.47																				0.47																											
	3	1.21																				0.47																											
	4	1.14																				0.47																											
	5	0.96																				0.47																											
	6	0.94																				0.47																											
	7	0.93			7.80	7.81					9.5		75		11				50		5.3	0.47																											
	8	0.90																				0.47																											
	9	0.86																				0.47																											
	10	0.85																				0.47																											
	11	0.82																				0.47																											
	12	0.97																				0.47																											
	13	0.78																				0.47																											
0.56 I	14	1.44			7.70	7.87					8.9		80		<5				58		<5	0.47																									<.01	0.44		1.0	0.63	1.3
	15	1.03																				0.47																											
	16	1.00																				0.47																											
0.08	17	0.88																				0.47																											
	18	0.87																				0.47																											
	19	0.76																				0.47																											
	20	0.78																				0.47																											
0.27	21	1.62			7.79	7.76					10.1		116		7				86		20	0.47																									<.01	0.61		20.6	0.82	2.5
0.31	22	1.29																				0.47																											
0.02	23	2.18																				0.47																											
2.04	24	1.87																				0.47																											
	25	1.75																				0.47																											
0.55	26	1.65																				0.47																											
2.18	27	1.64																				0.47																											
1.53	28	1.94			8.04	8.29					8.8		130		14				20		<5	0.47																									<.01	0.38		3.0	0.85	1.0
1.04 I	29	1.84																				0.47																											
	30	1.68																				0.47																											
I	31	1.37																				0.47																											
	Tot.	39.32											401		32				214		25																										2.8		GM	3.2	6.3
	Avg.	1.27											100		8				54		6	0.47																									<.01	0.7		3	0.8	1.6

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

_____ FLOW _____ BOD _____ SS

Tim Hodge OPERATOR

5867 CERT. NO.

270-965-2525 PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF Janvary 2016

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S) TMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E.COLI/100 ML x	Phosphours, Total	Nitrosen, Total
Rain"	1	1.17																				0.47																									
	2	1.06																				0.47																									
	3	0.99																				0.47																									
	4	0.94																				0.47																									
	5	0.91			6.74					9.96			86		7				51		11	0.47																						0.00	4.0		13.5	1.3	<0.75
	6	0.88																				0.47																									
	7	0.91																				0.47																									
0.17	8	1.18																				0.47																									
0.17	9	2.09																				0.47																									
1.20	10	1.37																				0.47																									
	11	1.69																				0.47																									
	12	1.45			7.25					8.98			73		13				53		11	0.47																						0.00	2.3		1413	0.9	1.0
T	13	1.28																				0.47																									
	14	1.27																				0.47																									
	15	1.25																				0.47																									
0.01	16	1.03																				0.47																									
	17	1.00																				0.47																									
	18	0.83																				0.47																									
	19	0.87			7.04					10.3			84		13				88		9.5	0.47																						0.00	3.8		464	0.91	1.2
0.17	20	0.87																				0.47																									
	21	0.93																				0.47																									
0.02	22	1.01																				0.47																									
0.06	23	0.96																				0.47																									
	24	0.60																				0.47																									
	25	1.54																				0.47																									
0.05	26	1.79			7.08					8.8			253		10				95		11	0.47																						0.06	5.9		2419.6	1.2	<0.75
	27	1.37																				0.47																									
	28	1.24																				0.47																									
	29	1.12																				0.47																									
	30	1.07																				0.47																									
	31	0.99																				0.47																									
	Tot.	35.66											496		43				287		42																											
	Avg.	1.15											124		11				72		10	0.47																						16.0		GM	4.3	2.2
																																												4.0		213	1.1	0.5

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION _____ FLOW _____ BOD _____ SS

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

Tim Hodge OPERATOR

5867 CERT. NO

270-965-2525 PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF February 2016

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

Rain	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY CBOD Mg/L: RAW	5 DAY CBOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY CBOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S) TMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: ECOLI/100 ML x	Phosphorus, T	Nitrogen, total
0.16	1	1.04																				047																									
	2	1.65				7.02					9.28		138		5				120		27	0.47																						0.02	3.6		29.2	1.1	<0.75
1.93	3	1.85																				0.47																									
	4	1.50																				0.47																									
	5	1.23																				047																									
	6	1.31																				0.47																									
	7	0.92																				0.47																									
0.01	8	1.01																				0.47																									
0.02	9	0.93				7.03					9.13		150		<5				100		<5	0.47																						0.03	4.6		2085	0.88	<0.75
0.01	10	0.87																				0.47																									
0.01	11	0.86																				0.47																									
0.04	12	0.88																				0.47																									
	13	0.73																				0.47																									
I	14	0.82																				0.47																									
0.46	15	1.08																				0.47																									
	16	1.64																				0.47																						0.02	6.4		2419	0.79	8.6
0.12	17	1.83				7.02					8.43		233		10				110		5.3	0.47																									
	18	1.83																				0.47																									
	19	1.42																				0.47																									
0.22	20	1.61																				0.47																									
	21	0.97																				0.47																									
	22	1.12																				0.47																						0.04	3.2		1.0	0.78	<0.75
	23	1.37				7.19					9.10		82		<5				53		<5	0.47																									
0.95	24	1.85																				0.47																									
0.24	25	1.82																				0.47																									
0.02	26	1.60																				0.47																									
	27	1.37																				0.47																									
	28	1.16																				0.47																									
	29	1.09																				0.47																									
	30																																																		
	31																																																		
	Tot.	37.36											603		15				383		32																									
	Avg.	1.29											151		4				96		8	0.47																						0.02	4.4		61	0.9	3.1

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET

Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED _____

_____ FLOW _____ BOD _____ SS

Tim Hodge OPERATOR

5867 CERT. NO.

270-965-2525 PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky — Crittenden COUNTY — MONTH OF March 2016

NPDES PERMIT NO. KY0020061 — PLANT CAPACITY 0.66 MGD — RECEIVING STREAM Rush Creek

Rain"	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY CBOD Mg/L: RAW	5 DAY CBOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY CBOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	RAW SLUDGE % DRY SOLIDS	RAW SLUDGE % VOLATILE SOLIDS	PRIMARY DIGESTER(S) TEMPERATURE PH	PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE % SOLIDS	DIGESTED SLUDGE % VOLATILE SOLIDS	DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E-COLI/100 ML x	Phosphorus, T	Nitrogen, total
0.38	1	1.59				7.29					8.25		124		6				68		<5	0.47																							0.02		4.3		2416	1.0	<0.75
T	2	1.25																				0.47																														
0.15	3	1.27																				0.47																														
	4	1.25																				0.47																														
	5	1.48																				0.47																														
	6	0.84																				0.47																														
	7	0.97																				0.47																														
	8	0.93				7.29					4.83		210		7				98		6.5	0.47		6.5																							<0.02		6.6		5.1	1.9	<0.75
T	9	1.65																				0.47																														
2.15	10	1.93																				0.47																														
1.08	11	1.95																				0.47																														
0.05	12	1.78																				0.47																														
0.72	13	1.83																				0.47																														
0.38	14	1.88																				0.47																														
0.11	15	1.80				7.30					8.80		328		5				61		<5	0.47																							<0.02		2.0		18.5	0.85	<0.75
	16	1.47																				0.47																														
	17	1.26																				0.47																														
I	18	1.18																				0.47																														
I	19	1.13																				0.47																														
	20	1.02																				0.47																														
0.23	21	1.03																				0.47																														
	22	0.96				7.33					7.36		70		7				55		<5	0.47																							<0.02		6.1		1.0	0.72	<0.75
	23	0.95																				0.47																														
	24	1.51																				0.47																														
0.60	25	1.12																				0.47																														
	26	0.99																				0.47																														
	27	1.31																				0.47																														
0.80	28	1.49																				0.47																														
	29	1.17				7.59					9.12		35		<5				13		<5	0.47																							<0.02		3.7		11.6	0.67	<0.75
	30	1.01																				0.47																														
1.55	31	1.75																				0.47																														
	Tot.	41.75											767		25				295		6																											22.7		6M	5.1		
	Avg.	1.35											153		5				59		1	0.47																							<0.02		4.5		19	1.0	<0.75

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED: _____

FLOW _____ BOD _____ SS _____

Tim Hodge — OPERATOR

5867 — CERT. NO.

270-965-2525 — PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. — Crittenden COUNTY — MONTH OF April 2016

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

Rain	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW
0.47	1	1.81										
	2	1.90										
	3	0.81										
	4	1.06										
	5	0.98				7.42					8.9	
	6	0.96										
0.05	7	1.09										
0.15	8	0.90										
	9	0.80										
	10	0.82										
0.05	11	1.38										
0.52	12	1.10				7.06					8.3	
	13	0.96										
	14	0.92										
0.02	15	0.89										
	16	0.97										
	17	0.81										
	18	0.73										
	19	0.71				6.96					7.13	
	20	0.69										
0.20	21	1.37										
0.73	22	1.02										
	23	0.80										
	24	0.74										
	25	0.73										
	26	1.00				7.00					6.4	
0.44	27	1.67										
1.75	28	1.77										
0.74	29	1.64										
	30	2.03										
	31											
	Tot.	33.06										
	Avg.	1.10										

DATE	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE RETURN: GAL/DAY x1000	ACTIVATED SLUDGE RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE WASTED: GAL. x 1000
1										0.47		
2										0.47		
3										0.47		
4										0.47		
5	45		6				36		<5	0.47		
6										0.47		6.5
7										0.47		
8										0.47		
9										0.47		
10										0.47		
11										0.47		
12	282		<5				90		<5	0.47		
13										0.47		
14										0.47		
15										0.47		
16										0.47		
17										0.47		
18										0.47		
19	101		<5				42		<5	0.47		9.6
20										0.47		9.6
21										0.47		
22										0.47		
23										0.47		
24										0.47		
25										0.47		
26	109		<5				66		<5	0.47		
27										0.47		
28										0.47		
29										0.47		
30										0.47		
31												
Tot.	537		<21				234		<20			
Avg.	134		<5				59		<5	0.47		

DATE	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	#1: MLSS Mg/L x 1000	#1: MLVSS Mg/L x 1000	#1: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	#1: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	#2: MLSS Mg/L x 1000	#2: MLVSS Mg/L x 1000	#2: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	#2: SETTLED SLUDGE VOL. (ML/L) 60 MIN.
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
Tot.										
Avg.										

DATE	SOLIDS HANDLING – RAW SLUDGE: GALLONS x 1000	RAW SLUDGE: % DRY SOLIDS	RAW SLUDGE: % VOLATILE SOLIDS	PRIMARY DIGESTER(S): TMPERATURE PH	PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE: % SOLIDS	DIGESTED SLUDGE: % VOLATILE SOLIDS	DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
Tot.										
Avg.										

DATE	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: [redacted] E.COLI/100 ML x	Phosphorus, T	nitrogen, total
1							
2							
3							
4							
5		<.02	4.5		1.0	0.75	<0.75
6							
7							
8							
9							
10							
11							
12		0.02	6.4		15.6	0.66	<0.75
13							
14							
15							
16							
17							
18							
19		<0.02	7.6		10.8	1.3	<0.75
20							
21							
22							
23							
24							
25							
26		0.02	8.9		8.5	1.5	<0.75
27							
28							
29							
30							
31							
Tot.		0.04	27.4		GM	4.21	
Avg.		0.01	6.8		6	1.05	<0.75

TOTAL NUMBER OF SEWER CONNECTIONS ________ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS ________ x ________ = ________ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET

Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED: ________

________ FLOW ________ BOD ________ SS

Tim Hodge — OPERATOR

5867 — CERT. NO.

270-965-2525 — PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF May 2016

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN: GAL/DAY x1000	ACTIVATED SLUDGE: RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED: GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE: % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S): TMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE: % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E-COLI/100 ML x [redacted]	Phosphorus, T	Nitrogen, total
Rain:																																																
1	1.03																	0.47																															
2	1.24																	0.47																															
3	1.09				7.10					6.5		106		<5				40		<5	0.47																							<0.02	4.9		248	1.0	<0.75
4	1.12																				0.47																											
0.15 5	0.96																				0.47																											
6	0.93																				0.47																											
7	0.89																				0.47																											
8	0.77																				0.47																											
T 9	0.88																				0.47																											
0.78 10	1.81				7.37					5.8		373		6				200		<5	0.47																							0.03	9.7		39.7	1.4	<0.75
0.40 11	1.60																				0.47																											
1.67 12	2.04																				0.47																											
0.67 13	2.16																				0.47																											
14	1.63																				0.47																											
15	0.66																				0.47																											
16	1.25																				0.47																											
0.48 17	1.85				7.27					6.1		244		6				120		5	0.47																							<0.02	6.7		241.9	1.3	<0.75
0.46 18	1.71																				0.47																											
19	1.28																				0.47																											
0.07 20	1.55																				0.47																											
0.21 21	1.20																				0.47																											
22	1.04																				0.47																											
23	0.95																				0.47																											
24	0.98				7.08					7.6		225		5				100		<5	0.47	6.5																						<0.02	7.7		24.8	1.7	<0.75
T 25	1.24																				0.47		2.0	2.58	1.88	260	220	0.8	4.86	3.22	510	370															
0.42 26	1.64																				0.47	6.5																											
0.73 27	1.88																				0.47																											
28	1.01																				0.47																											
29	0.87																				0.47																											
30	0.88																				0.47																											
31	0.81				7.02					5.3		148		<5				86		<5	0.47																							<0.02	7.6		23.5	1.2	<0.75
Tot.	38.95											1096						546																									0.08	36.6		6M	6.6	
Avg.	1.26											219		3				109		1	0.47																							<0.02	7.3		107	1.3	<0.75

TOTAL NUMBER OF SEWER CONNECTIONS_____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS_____ x _____ = _____ SEWERED POPULATION _____ _____ _____

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED:_____

FLOW BOD SS

Tim Hedge OPERATOR

5867 CERT. NO.

270-965-2525 PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF June 20 16

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

Rain	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS: PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS: FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN: FINAL	DISSOLVED OXYGEN: STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS: PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS: SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS: PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS: SEC. EFFLUENT OR FINAL	5 DAY CBOD Mg/L: RAW	5 DAY CBOD: PRIM. OR SEC. EFFLUENT	5 DAY CBOD: SEC. EFFLUENT OR FINAL
	1	0.80																			
0.12	2	0.76																			
	3	0.79																			
0.14	4	0.90																			
0.19	5	0.75																			
	6	0.75																			
0.12	7	0.72				7.02					5.0		200		5				140		<5
	8	0.59																			
	9	0.62																			
	10	0.63																			
	11	0.63																			
	12	0.46																			
	13	0.64																			
	14	0.52				7.05					4.01		171		<5				150		<5
T	15	0.57																			
0.22	16	0.60																			
	17	0.50																			
	18	0.48																			
T	19	0.47																			
0.02	20	0.47																			
	21	0.48				6.7					4.2		186		5				130		5.1
	22	0.47																			
	23	0.47																			
	24	0.59																			
	25	0.62																			
0.47	26	0.45																			
	27	0.49																			
0.02	28	0.45				6.8					2.8		96		5				130		5.1
	29	0.59																			
	30	0.52																			
	31																				
	Tot.	7.78											653		15				550		10
	Avg.	0.59											163		4				138		3

DATE	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	RETURN MLSS Mg/L x 1000	WASTED GAL. x 1000	AERATION BASIN #1 Contact: DISSOLVED OXYGEN Mg/L	#1: MLSS Mg/L x 1000	#1: MLVSS Mg/L x 1000	#1: SETTLED SLUDGE VOL. (Ml/L) 30 MIN.	#1: 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	#2: MLSS Mg/L x 1000	#2: MLVSS Mg/L x 1000	#2: SETTLED SLUDGE VOL. (Ml/L) 30 MIN.	#2: 60 MIN.
1	0.47		6.5										
2	0.47		3.2										
3	0.47		6.5										
4	0.47												
5	0.47												
6	0.47												
7	0.47		6.5										
8	0.47		3.2										
9	0.47		4.9										
10	0.47		6.5										
11	0.47												
12	0.47												
13	0.47												
14	0.47		6.5										
15	0.47												
16	0.47		4.9										
17	0.47		3.2										
18	0.47												
19	0.47												
20	0.47												
21	0.47		6.5										
22	0.47		3.2										
23	0.47												
24	0.47		6.5										
25	0.47												
26	0.47												
27	0.47												
28	0.47		6.5										
29	0.47												
30	0.47		4.9										
31													
Tot.													
Avg.	0.47												

DATE	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	RAW SLUDGE % DRY SOLIDS	RAW SLUDGE % VOLATILE SOLIDS	PRIMARY DIGESTER(S) TEMPERATURE PH	PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE % SOLIDS	DIGESTED SLUDGE % VOLATILE SOLIDS	DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: [redacted] E.COLI/100 ML x	Phosphorus, T	Nitrogen, Total
1																	
2																	
3																	
4																	
5																	
6																	
7												0.02	9.5		21.3	1.2	<0.75
8																	
9																	
10																	
11																	
12																	
13																	
14												<0.02	14		7.3	1.9	<0.75
15																	
16																	
17																	
18																	
19																	
20																	
21												<0.02	11		8.4	1.6	<0.75
22																	
23																	
24																	
25																	
26																	
27																	
28												0.02	11		22.3	5.4	<0.75
29																	
30																	
31																	
Tot.												0.04	45		GM	10.1	
Avg.												0.01	11		13	2.5	<0.75

TOTAL NUMBER OF SEWER CONNECTIONS ______ IND. WASTES POP. EQUIV.
SEWER CONNECTIONS ______ x ______ = ______ SEWERED POPULATION
NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water
NON-RESIDENT POULATION EQUIVALENT SERVED: ______

______ FLOW ______ BOD ______ SS

Tim Hodge
OPERATOR

5867
CERT. NO.

270-965-2525
PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF July 2016

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

Rain	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY CBOD Mg/L: RAW	5 DAY CBOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY CBOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN: DISSOLVED OXYGEN Mg/L	AERATION BASIN: MLSS Mg/L x 1000	AERATION BASIN: MLVSS Mg/L x 1000	AERATION BASIN: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN: DISSOLVED OXYGEN Mg/L	AERATION BASIN: MLSS Mg/L x 1000	AERATION BASIN: MLVSS Mg/L x 1000	AERATION BASIN: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S) TEMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: ECOLI/100 ML x	Phosphorus, Total	N: Trogen, Total
0.15	1	0.46																				0.47																										
	2	0.45																				0.47																										
	3	0.97																				0.47																										
2.05	4	2.06																				0.47																										
1.52	5	1.29			7.00						7.48		280		7				60		<5	0.47																							0.03	3.6		70	1.6	<0.75
	6	1.27																				0.47																										
2.07	7	1.83																				0.47																										
0.25	8	1.74																				0.47																										
T	9	1.28																				0.47																										
	10	0.64																				0.47																										
	11	0.80																				0.47																										
0.20	12	1.10			7.14						1.58		110		<5				65		<5	0.47																							<0.02	5.6		146	3.1	<0.75
0.17	13	0.79																				0.47	4.9																									
	14	0.73																				0.47																										
I	15	0.66																				0.47	3.2																										
	16	0.61																				0.47																										
	17	0.59																				0.47																										
	18	0.57																				0.47	3.2																										
I	19	0.55			7.01						8.19		149		6				89		<5	0.47	3.2																							0.02	4.4		91	2.8	<0.75
	20	1.64																				0.47	3.2																										
1.96	21	1.14																				0.47																										
0.06	22	0.93																				0.47																										
	23	0.91																				0.47																										
	24	0.50																				0.47																										
	25	0.64																				0.47																										
0.04	26	0.58			7.13						6.9		112		6				63		<5	0.47	3.2																							<0.02	4.6		114	3.3	<0.75
	27	0.87																				0.47	3.2																										
0.87	28	1.02																				0.47																										
0.04	29	0.78																				0.47																										
0.05	30	0.63																				0.47																										
	31	0.67																				0.47																										
	Tot.	28.90											651		24				277		<20																							0.05	18.2		GM	10.8	
	Avg.	0.93											163		6				69		<5	0.47																							0.01	4.5		101	2.7	<0.75

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION _____ _____ _____

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET — FLOW BOD SS

Division Of Water NON-RESIDENT POULATION EQUIVALENT SERVED: _____

Tim Hodge — OPERATOR

5867 — CERT. NO.

270-965-2525 — PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF August 2016

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

Rain"	DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY CBOD Mg/L: RAW	5 DAY CBOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY CBOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN GAL/DAY x1000	ACTIVATED SLUDGE: RETURN MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L) 60 MIN.	SOLIDS HANDLING: RAW SLUDGE GALLONS x 1000	RAW SLUDGE % DRY SOLIDS	RAW SLUDGE % VOLATILE SOLIDS	PRIMARY DIGESTER(S) TMPERATURE PH	PRIMARY DIGESTER(S) VOLATILE ACIDS (Mg/L)	PRIMARY DIGESTER(S) TOTAL ALKALINITY (Mg/L)	DIGESTED SLUDGE % SOLIDS	DIGESTED SLUDGE % VOLATILE SOLIDS	DIGESTED SLUDGE WITHDRAWN GALLONS x 1000	DIGESTED SLUDGE SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: FECOLI/100 ML x	Phosphorus, T Nitrogen, total
0.11	1	1.10																				0.47																									
0.39	2	0.75				7.30					9.0		223		<5				57		<5	0.47		3.2																						0.02	3.3		12.1	1.3 Kgas
0.55	3	1.32																				0.47		3.2																									
	4	0.91																				0.47																									
0.09	5	0.99																				0.47																									
	6	0.87																				0.47																									
	7	0.46																				0.47																									
	8	0.61																				0.47		3.2																									
	9	0.60				6.94					7.9		137		6				70		<5	0.47																						0.02	4.9		108.1	2.5 Kgas
	10	0.51																				0.47																									
	11	0.52																				0.47																									
	12	0.51																				0.47		6.5																									
	13	0.49																				0.47																									
	14	0.60																				0.47																									
0.41	15	0.57																				0.47																									
0.07	16	0.64				6.82					5.55		106		<5				110		<5	0.47																						<0.02	8.1		13.5	2.5 / <0.75
0.17	17	0.84																				0.47		4.9																									
0.30	18	0.71																				0.47		3.2																									
0.08	19	0.83																				0.47		3.2																									
0.14	20	0.64																				0.47																									
	21	0.31																				0.47																									
	22	0.48																				0.47																									
	23	0.48				5.76					6.44		148		<5				170		<5	0.47		3.2																						0.02	3.9		10.9	2.0 / <0.75
	24	0.48																				0.47		3.2																									
	25	0.46																				0.47		3.2																									
	26	0.90																				0.47		3.2																									
1.22	27	0.86																				0.47																									
	28	1.01																				0.47																									
0.29	29	0.75																				0.47																									
	30	0.61				6.94					5.54		74		6				95		<5	0.47																						0.02	3.0		71.7	3.3 / <0.75
	31	0.56																				0.47		6.5																									
	Tot.	21.37											688		<27				502		<25																									
	Avg.	0.69											138		<5				100		<5	0.47																						0.01	4.6		27	2.3 / <0.75

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED: _____

FLOW _____ BOD _____ SS _____

Tim Hodge
OPERATOR

5867
CERT. NO.

270-965-2525
PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, Ky. Crittenden COUNTY MONTH OF September 2016

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY BOD Mg/L: RAW	5 DAY BOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY BOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN: GAL/DAY x1000	ACTIVATED SLUDGE: RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED: GAL. x 1000	AERATION BASIN #1 Contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 Contact: MLSS Mg/L x 1000	AERATION BASIN #1 Contact: MLVSS Mg/L x 1000	AERATION BASIN #1 Contact: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #1 Contact: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE: % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S): TEMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE: % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: ECOLI/100 ML x	Phosphorus, T	Nitrogen, total
Rain"																																																	
1	0.53																					0.47																														
2	0.51																					0.47																														
3	0.50																					0.47																														
4	0.49																					0.47																														
5	0.39																					0.47																														
6	0.46				6.96					6.16			154		<5				110		<5	0.47		3.2																								<0.02		3.0		6.5	2.4	0.84
7	0.46																					0.47		3.2																												
8	0.34																					0.47																														
0.31 9	0.34																					0.47																														
10	0.36																					0.47																														
0.17 11	0.27																					0.47																														
12	0.27																					0.47																														
13	0.27				6.88					7.14			124		<5				110		<5	0.47		6.5																								<0.02		3.8		8.6	4.0	1.2
14	0.28																					0.47																														
0.01 15	0.31																					0.47																														
0.12 16	0.42																					0.47		3.2																												
0.70 17	0.165																					0.47																														
18	0.76																					0.47																														
19	0.34																					0.47																														
20	0.32				6.72					5.09			345		<5				92		<5	0.47		3.2																								0.03		1.7		40.2	2.8	1.4
21	0.30																					0.47		3.2																												
22	0.30																					0.47																														
23	0.32																					0.47																														
24	0.28																					0.47																														
25	0.27																					0.47																														
0.21 26	0.37																					0.47																														
0.05 27	0.29				6.66					7.23			182		<5				130		<5	0.47																									<0.02		1.6		35.9	2.7	2.0
28	0.27																					0.47		6.5																												
29	0.38																					0.47																														
0.05 30	0.46																					0.47		3.2																												
31																																																			
Tot.	11.53												805		<20				442		<20																												0.03		10.1		6M	11.9	5.4
Avg.	0.39												201		<5				111		<5	0.47																												<0.02		2.5		17	3.0	1.4

TOTAL NUMBER OF SEWER CONNECTIONS_____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS_____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED:_____

_____ FLOW _____ BOD _____ SS

Tim Hodge
OPERATOR

5867
CERT. NO.

270-965-2525
PLANT TELEPHONE

NAME OF SEWAGE TREATMENT PLANT City of Marion, KY. Crittenden COUNTY MONTH OF October 2016

NPDES PERMIT NO. KY0020061 PLANT CAPACITY 0.66 MGD RECEIVING STREAM Rush Creek

DATE	TOTAL FLOW (MILLION GALLONS)	RAW SEWAGE: GRIT REMOVED (CUBIC FEET)	RAW SEWAGE: SCREENINGS (CUBIC FEET)	pH: RAW	pH: FINAL	SETTLEABLE SOLIDS (Ml/L): RAW	SETTLEABLE SOLIDS (Ml/L): PRIMARY OR SEC. EFFLUENT	SETTLEABLE SOLIDS (Ml/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM ABOVE	DISSOLVED OXYGEN (Mg/L): FINAL	DISSOLVED OXYGEN (Mg/L): STREAM BELOW	SUSPENDED SOLIDS (Mg/L): RAW	SUSPENDED SOLIDS (Mg/L): PRIM. OR SEC. EFFLUENT	SUSPENDED SOLIDS (Mg/L): SEC. EFFLUENT OR FINAL	TOTAL SOLIDS (g/L): RAW	TOTAL SOLIDS (g/L): PRIM. OR SEC. EFFLUENT	TOTAL SOLIDS (g/L): SEC. EFFLUENT OR FINAL	5 DAY CBOD Mg/L: RAW	5 DAY CBOD Mg/L: PRIM. OR SEC. EFFLUENT	5 DAY CBOD Mg/L: SEC. EFFLUENT OR FINAL	ACTIVATED SLUDGE: RETURN: GAL/DAY x1000	ACTIVATED SLUDGE: RETURN: MLSS Mg/L x 1000	ACTIVATED SLUDGE: WASTED: GAL. x 1000	AERATION BASIN #1 contact: DISSOLVED OXYGEN Mg/L	AERATION BASIN #1 contact: MLSS Mg/L x 1000	AERATION BASIN #1 contact: MLVSS Mg/L x 1000	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #1 contact: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	AERATION BASIN #2 Re-Air: DISSOLVED OXYGEN Mg/L	AERATION BASIN #2 Re-Air: MLSS Mg/L x 1000	AERATION BASIN #2 Re-Air: MLVSS Mg/L x 1000	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 30 MIN.	AERATION BASIN #2 Re-Air: SETTLED SLUDGE VOL. (ML/L): 60 MIN.	SOLIDS HANDLING: RAW SLUDGE: GALLONS x 1000	SOLIDS HANDLING: RAW SLUDGE: % DRY SOLIDS	SOLIDS HANDLING: RAW SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: PRIMARY DIGESTER(S): TEMPERATURE PH	SOLIDS HANDLING: PRIMARY DIGESTER(S): VOLATILE ACIDS (Mg/L)	SOLIDS HANDLING: PRIMARY DIGESTER(S): TOTAL ALKALINITY (Mg/L)	SOLIDS HANDLING: DIGESTED SLUDGE: % SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: % VOLATILE SOLIDS	SOLIDS HANDLING: DIGESTED SLUDGE: WITHDRAWN GALLONS x 1000	SOLIDS HANDLING: DIGESTED SLUDGE: SLUDGE CAKE % SOLIDS	FINAL: CHLORINE RESIDUAL (Mg/L)	FINAL: FINAL	FINAL: NH3-N Mg/L	FINAL: NH3-N Mg/L RAW	FINAL: E.COLI/100 ML x [redacted]	Phosphorus, T	nitrogen, total
Rain"																						RETURN GAL/DAY x1000	RETURN MLSS Mg/L x 1000	WASTED GAL. x 1000	DISSOLVED OXYGEN Mg/L	MLSS Mg/L x 1000	MLVSS Mg/L x 1000	SETTLED SLUDGE VOL. (ML/L) 30 MIN.	SETTLED SLUDGE VOL. (ML/L) 60 MIN.	DISSOLVED OXYGEN Mg/L	MLSS Mg/L x 1000	MLVSS Mg/L x 1000	SETTLED SLUDGE VOL. (ML/L) 30 MIN.	SETTLED SLUDGE VOL. (ML/L) 60 MIN.	GALLONS x 1000	% DRY SOLIDS	% VOLATILE SOLIDS	TEMPERATURE PH	VOLATILE ACIDS (Mg/L)	TOTAL ALKALINITY (Mg/L)	% SOLIDS	% VOLATILE SOLIDS	WITHDRAWN GALLONS x 1000	SLUDGE CAKE % SOLIDS	CHLORINE RESIDUAL (Mg/L)	FINAL	NH3-N Mg/L	NH3-N Mg/L RAW	E.COLI/100 ML x [redacted]		
0.20	1 0.50																				0.47																													
0.23	2 0.25																				0.47																													
	3 0.31																				0.47																													
	4 0.30				6.64					6.23		117		8				140		<5	0.47																											<0.02		0.69		9.6	3.1	12.4
	5 0.29																				0.47			6.5																											
	6 0.28																				0.47																													
	7 0.26																				0.47			4.9																											
	8 0.24																				0.47																													
	9 0.23																				0.47																													
	10 0.24																				0.47																													
	11 0.24				6.40					6.72		163		5				180		<5	0.47			3.2																											
	12 0.36																				0.47			6.5																											
0.81	13 0.54																				0.47																													
	14 0.30																				0.47																													
	15 0.32																				0.47																													
	16 0.24																				0.47																													
	17 0.28																				0.47																													
	18 0.27				6.67					7.39		131		<5				140		<5	0.47																											<0.02		1.1		359	3.4	12.0
	19 0.25																				0.47			6.5																											
	20 0.28																				0.47			3.2																											
0.11	21 0.25																				0.47																													
	22 0.25																				0.47																													
	23 0.23																				0.47																													
	24 0.25																				0.47																													
	25 0.25				6.69					7.45		214		<5				200		<5	0.47			3.2																											
0.09	26 0.26																				0.47			3.2																											
	27 0.25																				0.47																													
	28 0.25																				0.47																													
	29 0.28																				0.47																													
	30 0.15																				0.47																													
	31 0.23																				0.47																													
	Tot. 8.63											625		<23				660		<20																											0.04		2.5		6M	12.7	9.6
	Avg. 0.29											156		<6				165		<5	0.47																											0.01		0.6		16	3.2	2.4

TOTAL NUMBER OF SEWER CONNECTIONS _____ IND. WASTES POP. EQUIV.

SEWER CONNECTIONS _____ x _____ = _____ SEWERED POPULATION

NATURAL RESOURCES AND ENVIROMENTAL PROTECTION CABINET
Division Of Water

NON-RESIDENT POULATION EQUIVALENT SERVED: _____

FLOW _____ BOD _____ SS _____

Tim Hodge
OPERATOR

5867
CERT. NO.

270-965-2525
PLANT TELEPHONE

Appendix X

2007 Flow Monitoring Study

AN ALL KENTUCKY CITY

City of Marion
Marion, KY

~~CSO~~ SSO
Flow Monitoring Report

April 4, 2008

CDG
Celebrating Excellence since 1994

Table of Contents

Introduction

The City of Marion, Kentucky has been under an Agreed Order since 1999. The City first step was to implement a Sanitary Sewer Evaluation System (SSES) program. Throughout this program many investigation techniques were utilized to pin point the areas that contribute to inflow and infiltration (I & I) the most. These areas where slated for rehabilitation and a capital expenditure construction project was executed to concentrate the systems overflow to two locations. Both of these locations are located adjacent to the wastewater treatment plant (WWTP).

As part of the Long-Term Control Plan (LTCP), Marion implemented a one year flow monitoring project of the overflow locations post construction. As part of this project, two Sigma 910 flow monitors have been in place since June 2007. These meters log the level and the velocity of the flow in the pipe on fifteen (15) minute intervals. The flow is then calculated based on either Hazen-Williams or Mannings formulas. A single sensor would be used in the outlet of each overflow pipe and would record the level and velocity of the flow through each overflow pipe.

Flow Monitoring

Set up

Two sanitary sewer overflows (SSO) were utilized for meter locations. One meter is located in the last main line manhole prior to entering the treatment plant property. This location is on the bank of a creek and just prior to a constriction in the system. The downstream pipe is 8-inches in diameter smaller than the upstream pipe in that manhole. During high flow, some of the overflow at this location is due to the bottleneck in this line not necessarily the plants capacity. In order the monitor overflows at this location, a 16-in overflow pipe was inserted into the top of the manhole. The second location for a meter is on the plant's property just before the influent into the plant. This overflow is a 10-in overflow pipe that is located approximately 5-ft from the bottom of the manhole and 5-ft from the top. Rainfall accumulations were tracked as well. The rainfall was tracked on daily totals received at the treatment plant.

Data

The following table is a monthly summary of flow for each overflow site and for the total overflows for the system. Please refer to the appendix for the full daily tabular report and flow versus time graphs. The daily tabular report includes a breakdown per location, a total for both locations, and the daily rain accumulations. For a pictorial representation, the graphs include the total flow and rain plotted on a separate axis.

Table No. 1 Monthly Totals

MONTH	MAIN LINE METER (OVERFLOW) (gal)	SEWER PLANT METER (OVERFLOW) (gal)	TOTAL FLOW (OVERFLOW) (gal)	RAIN (in)	AVG. RAIN (in)
June	38,000	18,000	56,000	2.47	4.05
July	488,000	166,000	654,000	5.94	4.52
August	-	-	-	3.58	3.56
September	-	-	-	3.40	3.28
October	1,936,000	-	1,936,000	5.61	3.28
November	438,000	95,000	533,000	3.23	4.80
December	24,516,000	7,440,000	31,956,000	9.30	5.05
January	-	2,068,000	2,068,000	2.23	4.01
February	2,253,000	6,907,000	9,160,000	4.71	4.48
March	3,944,000	10,821,000	14,765,000	10.22	4.70

Interpretation of Data

During the monitoring period, many of the months experienced well above average rainfalls. It is expected in these cases that the system would encounter significant overflows. In the months that did not experience high rainfalls little to no overflows were detected, with the exception of January. The overflows in January are most likely a response to the extreme wet weather in December. In other words, due to the unusually high water table caused by rain events just prior to January the effects of January's rain events are magnified.

Unfortunately, the rain data available is daily totals not hourly so many of these events can not be classified. However, the significant overflows were a result of more than 3.0 inches of rain in a 48 hour period during a generally dry time frame. During the months of more regular precipitation, the overflow occurrence

reduced to an event with more that 1.0 inches within 24 hours. Again, this is an effect of the high water table during months with consistently high rainfall.

The month of July exhibited the first significant overflow volume of 654,000 gallons. The precipitation that month was approximately 30% greater than the average. However, the overflow volume was concentrated to one rain event. On July 5, 2007, the City of Marion received 5.10 inches of rain within a few hours time. It is important to note the plant was able to recover from this event in less than 24 hours. By July 6, 2007 there was no overflow detected.

August did not show any overflows, and the monthly rainfall was within the average for August. It is however, interesting to note that on August 30, 2007 3.10 inches of rain was recorded. At this time of year, the water table is relatively low; therefore, the system was not affected by this rain event.

Precipitation in October was 70% greater than the average for that month. The rainfall was concentrated to two main events which were separated by only four days. The first event was October 17th and 18th and consisted of over 2 inches of rainfall. This event is not in itself significant, however, an additional 3 inches was received just four days later. The first event did not cause any overflows, yet the later event produced over 1.9 million gallons of overflow in a three day period.

November experienced a few small rain events, all of which were less than 2.0 in 24 hours. However, it did have eight overflow events. Each overflow event was rather small ranging from 4,000 gallons to 76,000 gallons per event. The monthly total was 533,000 gallons.

December was the highest overflow month for this monitoring period. There are two main factors contributing to the almost 32 million gallons of overflow. One, the rainfall total for the month was 85% above the average rainfall for December. In fact, there was a nine day stretch that had precipitation everyday. The other explanation for the overflows this month was the location of the meter. The raw data from the main line meter, which recorded 24.5 million gallons of the overflow, exhibited some unusual patterns. This meter is located on the bank of a large creek, and the overflow pipe is piped directly into the slope of the creek. Due to the location of the overflow pipe, it seems that during this month of extreme rainfall, that creek was running notably high. The level in the creek becomes significant because of the location of the overflow pipe. At this level the pipe becomes submerged by the creek and much of the readings on the meter were misleading. The total head was not controlled continually by the level of sewage in the manhole, but instead was alternating between the level in the manhole and the level in the creek. Therefore, there was continual flow across the sensor, however, much of the readings were from flow flowing into the manhole as well as out. In this situation, it is difficult to predict the actual overflow experienced, yet it is practical to assume that it was considerably less than what the meter recorded.

The rainfall recorded for January was rather low; however, the main event was in the second week of the month. This event was on the tail end of the heavy rains in December, and is the main contributor to the total overflow for the month.

During February, Marion did not receive a great deal of rain. It did however rain consistently throughout the month and with an already elevated water table the treatment plant was never able to catch up. Consequently, throughout the month there was some level of overflow each day.

The month of March experienced extremely high levels of rain, more than double the average for the month. It consistently rained throughout the month with three major events each contributing more than 1 million gallons of overflow in a day's time. During this month, the sewer plant location overflowed to some extent everyday.

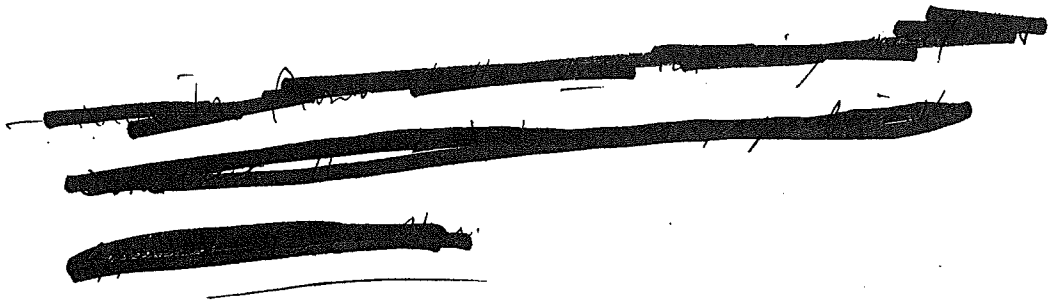
Conclusion

The Marion Treatment Plant does not experience elevated overflow volumes due to rain events during dry weather months when the water table is low. In addition, during such times the overflows are due to inflow not infiltration. This is evident when viewing the graphs. They show that the peak of rain and the peak in the overflows are happening concurrently with little to no delay. While during traditionally wet weather months, the overflows are considerably higher and there appears to be a slight delay in the peak. This type of results concludes that the rehabilitation work conducted during the capital expenditure project, was quite successful in reducing the major sources of I & I.

Recommendations

CDG recommends that the line between the last main line manhole and the treatment plant be upsized to a 24" or 30" line. Also, that manhole needs a few improvements. The overflow pipe should be removed, the walls should be epoxy coated, and a belly pan should be inserted into the manhole. The improvements to the manhole will reduce the I & I at that location, which CDG believes is largely due to its proximity to the creek. The upgrade to the downstream line will allow the flow to be transported to the treatment plant property and all overflows may

be contained at one location. The larger diameter line will not only eliminate the constriction that is currently present, but will also supply a limited amount of storage which will reduce some of the minor overflows at the plant.



Appendix

Daily Tabular Flow Totals including Rain

Graphical Flow and Rain vs. Time

OVERFLOW DATA
Marion, Ky

DATE	MAIN LINE METER (gal) x1,000,000	SEWER PLANT METER (gal) x1,000,000	TOTAL (gal) x1,000,000	RAIN (in)
06/01/07	0.000	0.000	0.000	0.000
06/02/07	0.000	0.000	0.000	0.000
06/03/07	0.000	0.000	0.000	0.160
06/04/07	0.000	0.000	0.000	0.000
06/05/07	0.000	0.000	0.000	0.000
06/06/07	0.000	0.000	0.000	0.000
06/07/07	0.000	0.000	0.000	0.000
06/08/07	0.038	0.018	0.056	1.000
06/09/07	0.000	0.000	0.000	0.000
06/10/07	0.000	0.000	0.000	0.000
06/11/07	0.000	0.000	0.000	0.000
06/12/07	0.000	0.000	0.000	0.000
06/13/07	0.000	0.000	0.000	0.000
06/14/07	0.000	0.000	0.000	0.000
06/15/07	0.000	0.000	0.000	0.000
06/16/07	0.000	0.000	0.000	0.000
06/17/07	0.000	0.000	0.000	0.000
06/18/07	0.000	0.000	0.000	0.000
06/19/07	0.000	0.000	0.000	0.070
06/20/07	0.000	0.000	0.000	0.000
06/21/07	0.000	0.000	0.000	0.000
06/22/07	0.000	0.000	0.000	0.000
06/23/07	0.000	0.000	0.000	0.450
06/24/07	0.000	0.000	0.000	0.140
06/25/07	0.000	0.000	0.000	0.280
06/26/07	0.000	0.000	0.000	0.170
06/27/07	0.000	0.000	0.000	0.200
06/28/07	0.000	0.000	0.000	0.000
06/29/07	0.000	0.000	0.000	0.000
06/30/07	0.000	0.000	0.000	0.000
07/01/07	0.000	0.000	0.000	0.000
07/02/07	0.000	0.000	0.000	0.000
07/03/07	0.000	0.000	0.000	0.000
07/04/07	0.000	0.000	0.000	0.000
07/05/07	0.488	0.166	0.654	5.100
07/06/07	0.000	0.000	0.000	0.000
07/07/07	0.000	0.000	0.000	0.000
07/08/07	0.000	0.000	0.000	0.000
07/09/07	0.000	0.000	0.000	0.000
07/10/07	0.000	0.000	0.000	0.000
07/11/07	0.000	0.000	0.000	0.020
07/12/07	0.000	0.000	0.000	0.000

OVERFLOW DATA
Marion, Ky

DATE	MAIN LINE METER (gal) x1,000,000	SEWER PLANT METER (gal) x1,000,000	TOTAL (gal) x1,000,000	RAIN (in)
07/13/07	0.000	0.000	0.000	0.000
07/14/07	0.000	0.000	0.000	0.000
07/15/07	0.000	0.000	0.000	0.000
07/16/07	0.000	0.000	0.000	0.000
07/17/07	0.000	0.000	0.000	0.000
07/18/07	0.000	0.000	0.000	0.000
07/19/07	0.000	0.000	0.000	0.000
07/20/07	0.000	0.000	0.000	0.820
07/21/07	0.000	0.000	0.000	0.000
07/22/07	0.000	0.000	0.000	0.000
07/23/07	0.000	0.000	0.000	0.000
07/24/07	0.000	0.000	0.000	0.000
07/25/07	0.000	0.000	0.000	0.000
07/26/07	0.000	0.000	0.000	0.000
07/27/07	0.000	0.000	0.000	0.000
07/28/07	0.000	0.000	0.000	0.000
07/29/07	0.000	0.000	0.000	0.000
07/30/07	0.000	0.000	0.000	0.000
07/31/07	0.000	0.000	0.000	0.000
08/01/07	0.000	0.000	0.000	0.000
08/02/07	0.000	0.000	0.000	0.000
08/03/07	0.000	0.000	0.000	0.000
08/04/07	0.000	0.000	0.000	0.000
08/05/07	0.000	0.000	0.000	0.000
08/06/07	0.000	0.000	0.000	0.000
08/07/07	0.000	0.000	0.000	0.000
08/08/07	0.000	0.000	0.000	0.000
08/09/07	0.000	0.000	0.000	0.000
08/10/07	0.000	0.000	0.000	0.000
08/11/07	0.000	0.000	0.000	0.000
08/12/07	0.000	0.000	0.000	0.000
08/13/07	0.000	0.000	0.000	0.000
08/14/07	0.000	0.000	0.000	0.200
08/15/07	0.000	0.000	0.000	0.000
08/16/07	0.000	0.000	0.000	0.000
08/17/07	0.000	0.000	0.000	0.220
08/18/07	0.000	0.000	0.000	0.000
08/19/07	0.000	0.000	0.000	0.000
08/20/07	0.000	0.000	0.000	0.000
08/21/07	0.000	0.000	0.000	0.060
08/22/07	0.000	0.000	0.000	0.000
08/23/07	0.000	0.000	0.000	0.000

OVERFLOW DATA
Marion, Ky

DATE	MAIN LINE METER (gal) x1,000,000	SEWER PLANT METER (gal) x1,000,000	TOTAL (gal) x1,000,000	RAIN (in)
08/24/07	0.000	0.000	0.000	0.000
08/25/07	0.000	0.000	0.000	0.000
08/26/07	0.000	0.000	0.000	0.000
08/27/07	0.000	0.000	0.000	0.000
08/28/07	0.000	0.000	0.000	0.000
08/29/07	0.000	0.000	0.000	0.000
08/30/07	0.000	0.000	0.000	3.100
08/31/07	0.000	0.000	0.000	0.000
09/01/07	0.000	0.000	0.000	0.000
09/02/07	0.000	0.000	0.000	0.000
09/03/07	0.000	0.000	0.000	0.000
09/04/07	0.000	0.000	0.000	0.000
09/05/07	0.000	0.000	0.000	0.000
09/06/07	0.000	0.000	0.000	0.000
09/07/07	0.000	0.000	0.000	0.200
09/08/07	0.000	0.000	0.000	0.350
09/09/07	0.000	0.000	0.000	0.040
09/10/07	0.000	0.000	0.000	0.210
09/11/07	0.000	0.000	0.000	0.000
09/12/07	0.000	0.000	0.000	0.000
09/13/07	0.000	0.000	0.000	0.000
09/14/07	0.000	0.000	0.000	0.000
09/15/07	0.000	0.000	0.000	0.000
09/16/07	0.000	0.000	0.000	0.000
09/17/07	0.000	0.000	0.000	0.000
09/18/07	0.000	0.000	0.000	0.000
09/19/07	0.000	0.000	0.000	0.000
09/20/07	0.000	0.000	0.000	0.000
09/21/07	0.000	0.000	0.000	0.000
09/22/07	0.000	0.000	0.000	0.000
09/23/07	0.000	0.000	0.000	0.000
09/24/07	0.000	0.000	0.000	0.000
09/25/07	0.000	0.000	0.000	1.400
09/26/07	0.000	0.000	0.000	1.200
09/27/07	0.000	0.000	0.000	0.000
09/28/07	0.000	0.000	0.000	0.000
09/29/07	0.000	0.000	0.000	0.000
09/30/07	0.000	0.000	0.000	0.000
10/01/07	0.000	0.000	0.000	0.000
10/02/07	0.000	0.000	0.000	0.000
10/03/07	0.000	0.000	0.000	0.000
10/04/07	0.000	0.000	0.000	0.000

OVERFLOW DATA
Marion, Ky

DATE	MAIN LINE METER (gal) x1,000,000	SEWER PLANT METER (gal) x1,000,000	TOTAL (gal) x1,000,000	RAIN (in)
10/05/07	0.000	0.000	0.000	0.000
10/06/07	0.000	0.000	0.000	0.000
10/07/07	0.000	0.000	0.000	0.000
10/08/07	0.000	0.000	0.000	0.000
10/09/07	0.000	0.000	0.000	0.120
10/10/07	0.000	0.000	0.000	0.000
10/11/07	0.000	0.000	0.000	0.000
10/12/07	0.000	0.000	0.000	0.000
10/13/07	0.000	0.000	0.000	0.000
10/14/07	0.000	0.000	0.000	0.000
10/15/07	0.000	0.000	0.000	0.000
10/16/07	0.000	0.000	0.000	0.280
10/17/07	0.000	0.000	0.000	1.040
10/18/07	0.000	0.000	0.000	1.050
10/19/07	0.000	0.000	0.000	0.000
10/20/07	0.000	0.000	0.000	0.000
10/21/07	0.000	0.000	0.000	0.000
10/22/07	0.000	0.000	0.000	0.000
10/23/07	1.212	0.000	1.212	1.140
10/24/07	0.459	0.000	0.459	1.550
10/25/07	0.265	0.000	0.265	0.300
10/26/07	0.000	0.000	0.000	0.130
10/27/07	0.000	0.000	0.000	0.000
10/28/07	0.000	0.000	0.000	0.000
10/29/07	0.000	0.000	0.000	0.000
10/30/07	0.000	0.000	0.000	0.000
10/31/07	0.000	0.000	0.000	0.000
11/01/07	0.000	0.004	0.004	0.000
11/02/07	0.000	0.000	0.000	0.000
11/03/07	0.000	0.000	0.000	0.000
11/04/07	0.000	0.060	0.060	0.000
11/05/07	0.000	0.031	0.031	0.000
11/06/07	0.000	0.000	0.000	0.000
11/07/07	0.000	0.000	0.000	0.000
11/08/07	0.000	0.000	0.000	0.000
11/09/07	0.000	0.000	0.000	0.000
11/10/07	0.000	0.000	0.000	0.000
11/11/07	0.000	0.000	0.000	0.000
11/12/07	0.000	0.000	0.000	0.000
11/13/07	0.000	0.000	0.000	0.500
11/14/07	0.027	0.000	0.027	0.000
11/15/07	0.000	0.000	0.000	0.000

OVERFLOW DATA
Marion, Ky

DATE	MAIN LINE METER (gal) x1,000,000	SEWER PLANT METER (gal) x1,000,000	TOTAL (gal) x1,000,000	RAIN (in)
11/16/07	0.000	0.000	0.000	0.000
11/17/07	0.000	0.000	0.000	0.000
11/18/07	0.000	0.000	0.000	0.000
11/19/07	0.000	0.000	0.000	0.000
11/20/07	0.000	0.000	0.000	0.000
11/21/07	0.037	0.000	0.037	1.730
11/22/07	0.076	0.000	0.076	0.000
11/23/07	0.000	0.000	0.000	0.000
11/24/07	0.000	0.000	0.000	0.000
11/25/07	0.283	0.000	0.283	0.000
11/26/07	0.015	0.000	0.015	0.930
11/27/07	0.000	0.000	0.000	0.070
11/28/07	0.000	0.000	0.000	0.000
11/29/07	0.000	0.000	0.000	0.000
11/30/07	0.000	0.000	0.000	0.000
12/01/07	0.000	0.000	0.000	0.000
12/02/07	1.265	0.000	1.265	1.730
12/03/07	0.552	0.000	0.552	0.000
12/04/07	0.000	0.000	0.000	0.000
12/05/07	0.000	0.000	0.000	0.000
12/06/07	0.000	0.000	0.000	0.000
12/07/07	0.287	0.202	0.489	0.860
12/08/07	2.926	1.326	4.252	0.150
12/09/07	1.068	1.068	2.136	1.260
12/10/07	5.065	0.919	5.984	0.480
12/11/07	0.266	0.809	1.075	0.500
12/12/07	2.217	1.177	3.394	0.800
12/13/07	3.432	0.910	4.342	0.000
12/14/07	0.007	0.009	0.016	0.000
12/15/07	4.641	0.010	4.651	1.940
12/16/07	2.055	0.002	2.057	0.210
12/17/07	0.000	0.065	0.065	0.000
12/18/07	0.000	0.032	0.032	0.000
12/19/07	0.000	0.003	0.003	0.000
12/20/07	0.000	0.108	0.108	0.000
12/21/07	0.000	0.120	0.120	0.230
12/22/07	0.016	0.130	0.146	0.480
12/23/07	0.346	0.286	0.632	0.000
12/24/07	0.000	0.063	0.063	0.000
12/25/07	0.000	0.027	0.027	0.000
12/26/07	0.066	0.074	0.140	0.340
12/27/07	0.253	0.075	0.328	0.250

OVERFLOW DATA
Marion, Ky

DATE	MAIN LINE METER (gal) x1,000,000	SEWER PLANT METER (gal) x1,000,000	TOTAL (gal) x1,000,000	RAIN (in)
12/28/07	0.054	0.025	0.079	0.070
12/29/07	0.000	0.000	0.000	0.000
12/30/07	0.000	0.000	0.000	0.000
12/31/07	0.000	0.000	0.000	0.000
01/01/08	0.000	0.000	0.000	0.000
01/02/08	0.000	0.000	0.000	0.000
01/03/08	0.000	0.000	0.000	0.000
01/04/08	0.000	0.017	0.017	0.000
01/05/08	0.000	0.134	0.134	0.100
01/06/08	0.000	0.169	0.169	0.000
01/07/08	0.000	0.077	0.077	0.070
01/08/08	0.000	0.255	0.255	0.060
01/09/08	0.000	0.554	0.554	0.840
01/10/08	0.000	0.372	0.372	0.330
01/11/08	0.000	0.317	0.317	0.000
01/12/08	0.000	0.075	0.075	0.000
01/13/08	0.000	0.068	0.068	0.200
01/14/08	0.000	0.003	0.003	0.000
01/15/08	0.000	0.000	0.000	0.000
01/16/08	0.000	0.000	0.000	0.190
01/17/08	0.000	0.006	0.006	0.000
01/18/08	0.000	0.000	0.000	0.000
01/19/08	0.000	0.000	0.000	0.000
01/20/08	0.000	0.000	0.000	0.000
01/21/08	0.000	0.000	0.000	0.000
01/22/08	0.000	0.021	0.021	0.020
01/23/08	0.000	0.000	0.000	0.000
01/24/08	0.000	0.000	0.000	0.000
01/25/08	0.000	0.000	0.000	0.000
01/26/08	0.000	0.000	0.000	0.000
01/27/08	0.000	0.000	0.000	0.000
01/28/08	0.000	0.000	0.000	0.000
01/29/08	0.000	0.000	0.000	0.060
01/30/08	0.000	0.000	0.000	0.360
01/31/08	0.000	0.000	0.000	0.000
02/01/08	0.000	0.000	0.000	0.190
02/02/08	0.000	0.000	0.000	0.000
02/03/08	0.000	0.000	0.000	0.000
02/04/08	0.000	0.040	0.040	0.020
02/05/08	0.103	0.052	0.155	0.010
02/06/08	0.617	0.611	1.228	0.200
02/07/08	0.001	0.339	0.340	0.020

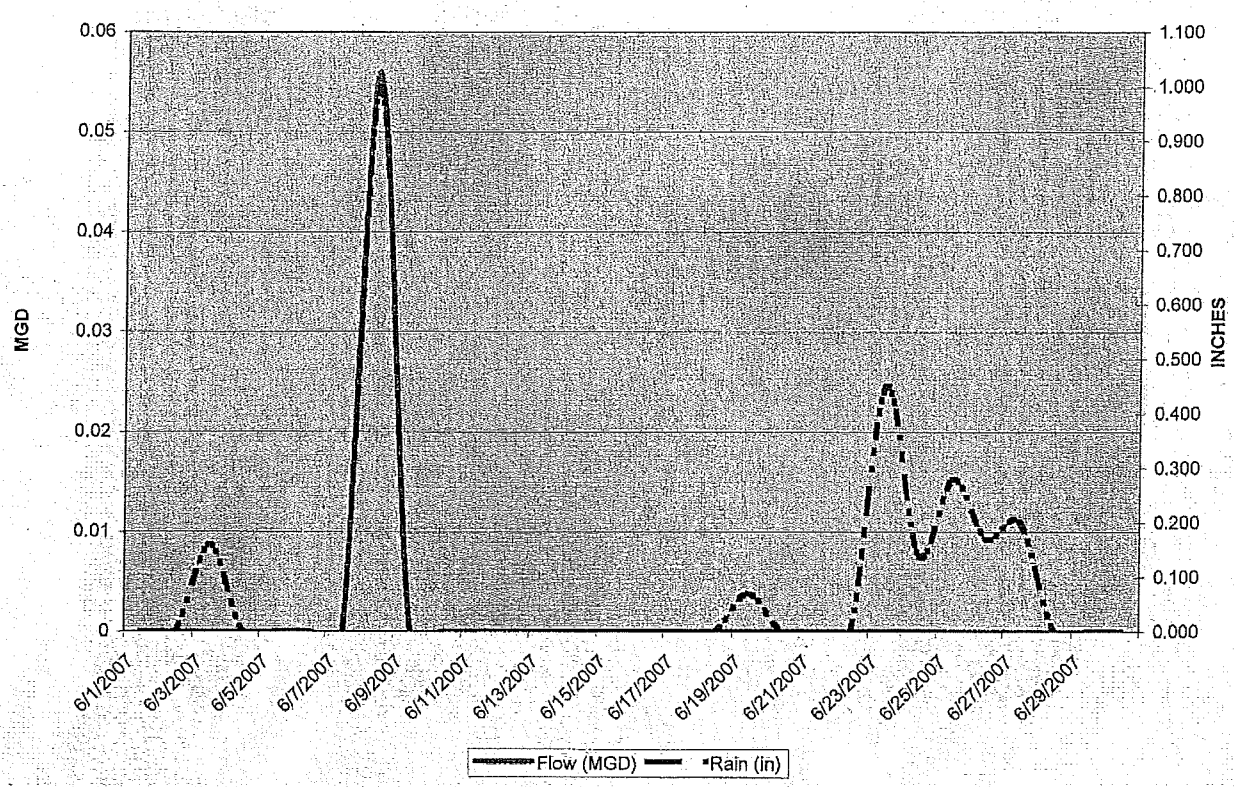
OVERFLOW DATA
Marion, Ky

DATE	MAIN LINE METER (gal) x1,000,000	SEWER PLANT METER (gal) x1,000,000	TOTAL (gal) x1,000,000	RAIN (in)
02/08/08	0.000	0.092	0.092	0.000
02/09/08	0.000	0.012	0.012	0.000
02/10/08	0.000	0.105	0.105	0.000
02/11/08	0.037	0.074	0.111	0.000
02/12/08	0.727	0.648	1.375	2.330
02/13/08	0.013	0.476	0.489	0.290
02/14/08	0.226	0.365	0.591	0.000
02/15/08	0.012	0.467	0.479	0.000
02/16/08	0.000	0.255	0.255	0.000
02/17/08	0.136	0.425	0.561	0.310
02/18/08	0.000	0.177	0.177	0.010
02/19/08	0.000	0.025	0.025	0.000
02/20/08	0.000	0.019	0.019	0.000
02/21/08	0.095	0.136	0.231	0.030
02/22/08	0.274	0.584	0.858	1.010
02/23/08	0.009	0.464	0.473	0.000
02/24/08	0.002	0.381	0.383	0.110
02/25/08	0.001	0.393	0.394	0.000
02/26/08	0.000	0.388	0.388	0.090
02/27/08	0.000	0.204	0.204	0.040
02/28/08	0.000	0.104	0.104	0.040
02/29/08	0.000	0.071	0.071	0.010
03/01/08	0.000	0.117	0.117	0.000
03/02/08	0.000	0.032	0.032	0.040
03/03/08	0.000	0.516	0.516	0.000
03/04/08	0.000	1.244	1.244	3.200
03/05/08	0.286	1.000	1.286	0.110
03/06/08	0.043	0.507	0.550	0.000
03/07/08	0.000	0.264	0.264	0.000
03/08/08	0.069	0.348	0.417	0.120
03/09/08	0.454	0.520	0.974	0.000
03/10/08	0.022	0.532	0.554	0.000
03/11/08	0.000	0.246	0.246	0.000
03/12/08	0.000	0.075	0.075	0.000
03/13/08	0.000	0.005	0.005	0.000
03/14/08	0.018	0.427	0.445	0.100
03/15/08	0.000	0.323	0.323	0.310
03/16/08	0.000	0.114	0.114	0.000
03/17/08	0.000	0.042	0.042	0.000
03/18/08	0.000	0.860	0.860	0.280
03/19/08	2.099	1.322	3.421	5.840
03/20/08	0.908	1.230	2.138	0.090

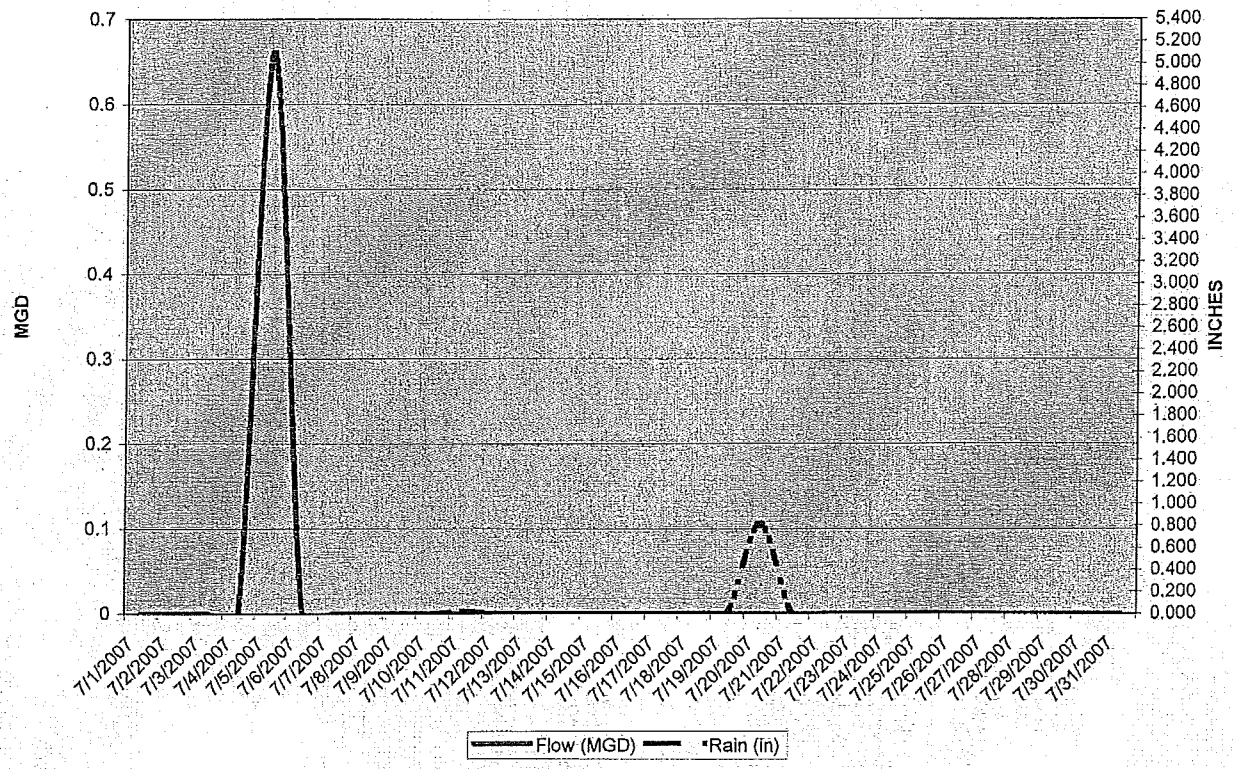
OVERFLOW DATA
Marion, Ky

DATE	MAIN LINE METER (gal) x1,000,000	SEWER PLANT METER (gal) x1,000,000	TOTAL (gal) x1,000,000	RAIN (in)
03/21/08	0.045	0.651	0.696	0.000
03/22/08	0.000	0.202	0.202	0.000
03/23/08	0.000	0.028	0.028	0.000
03/24/08	0.000	0.179	0.179	0.130
03/25/08	0.000	0.037	0.037	0.000

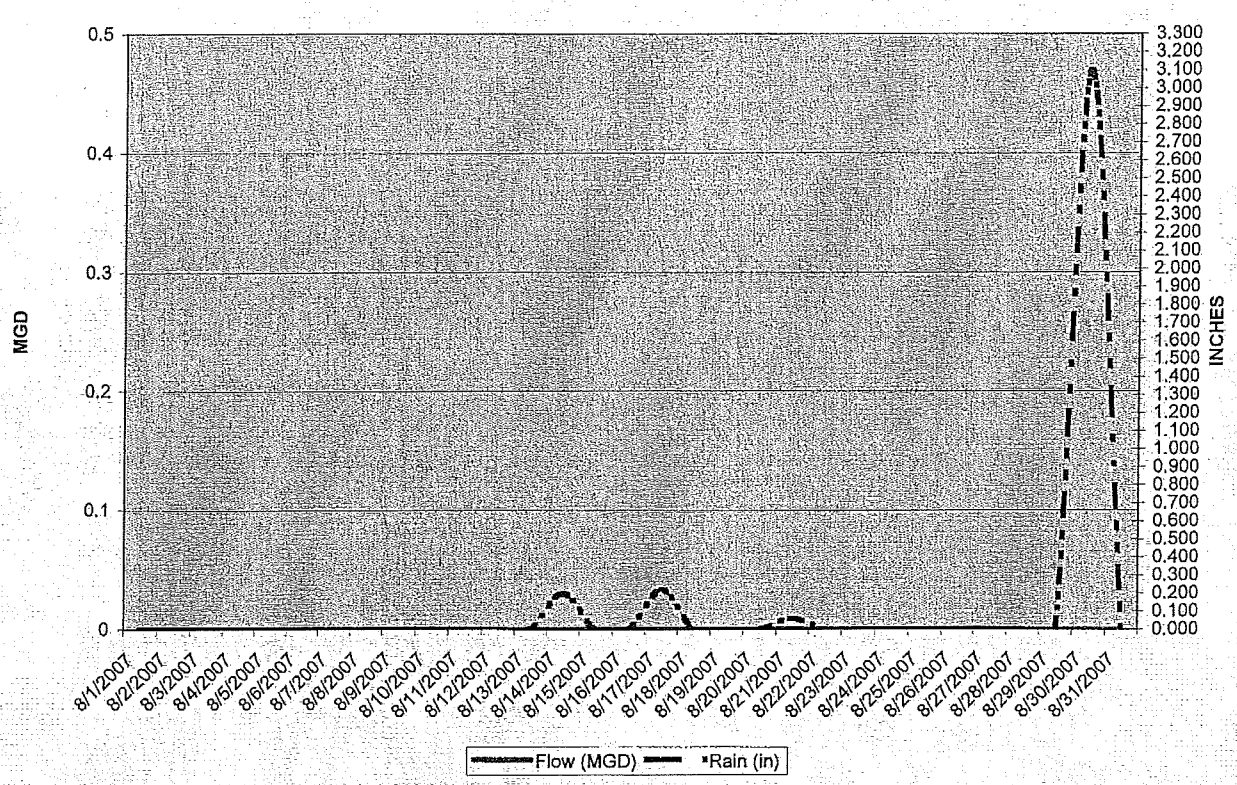
Marion, KY Overflow



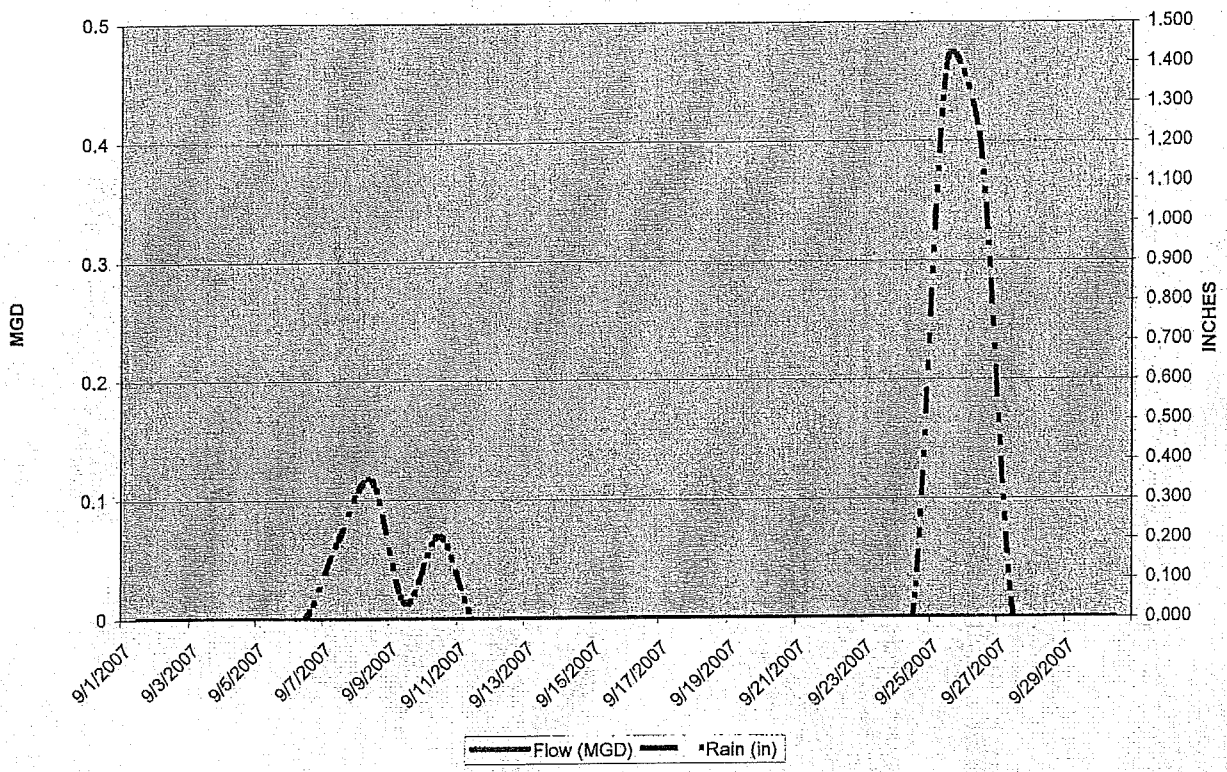
Marion, KY Overflow

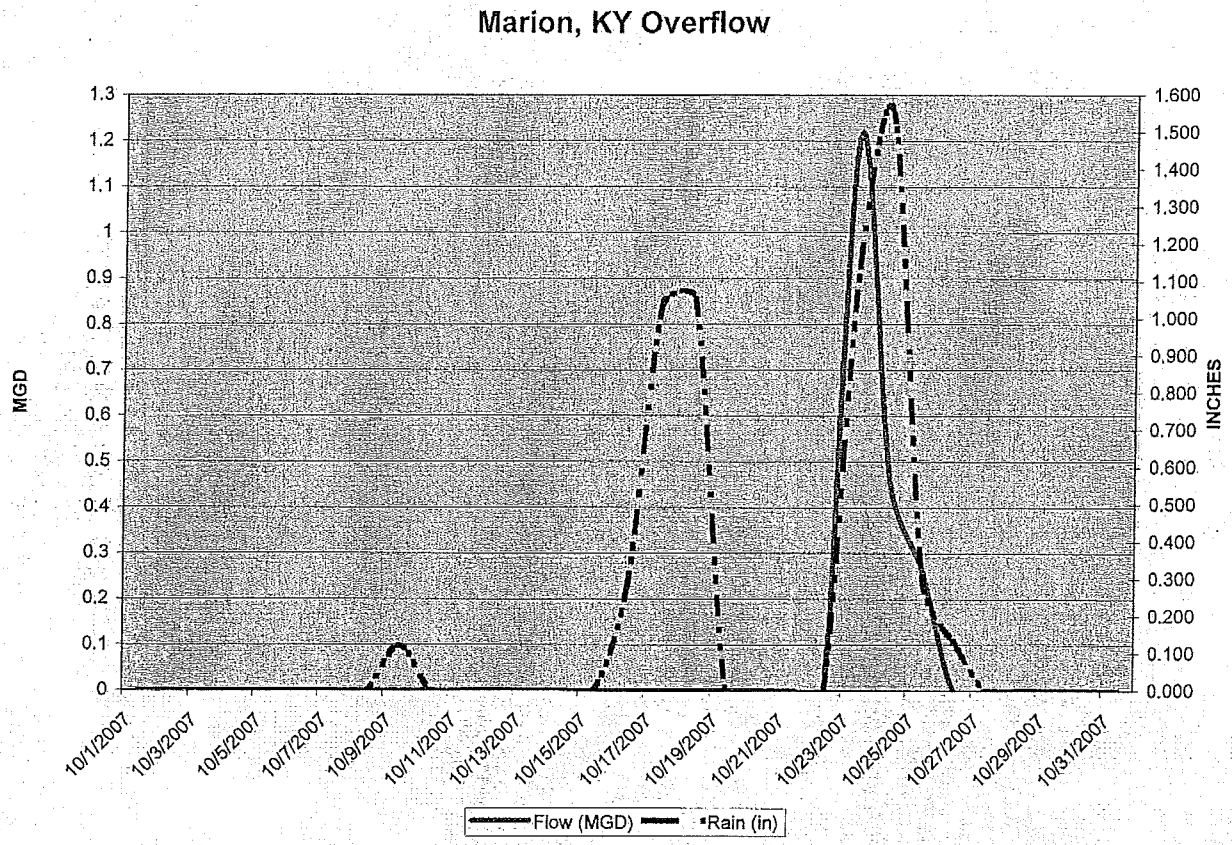


Marion, KY Overflow

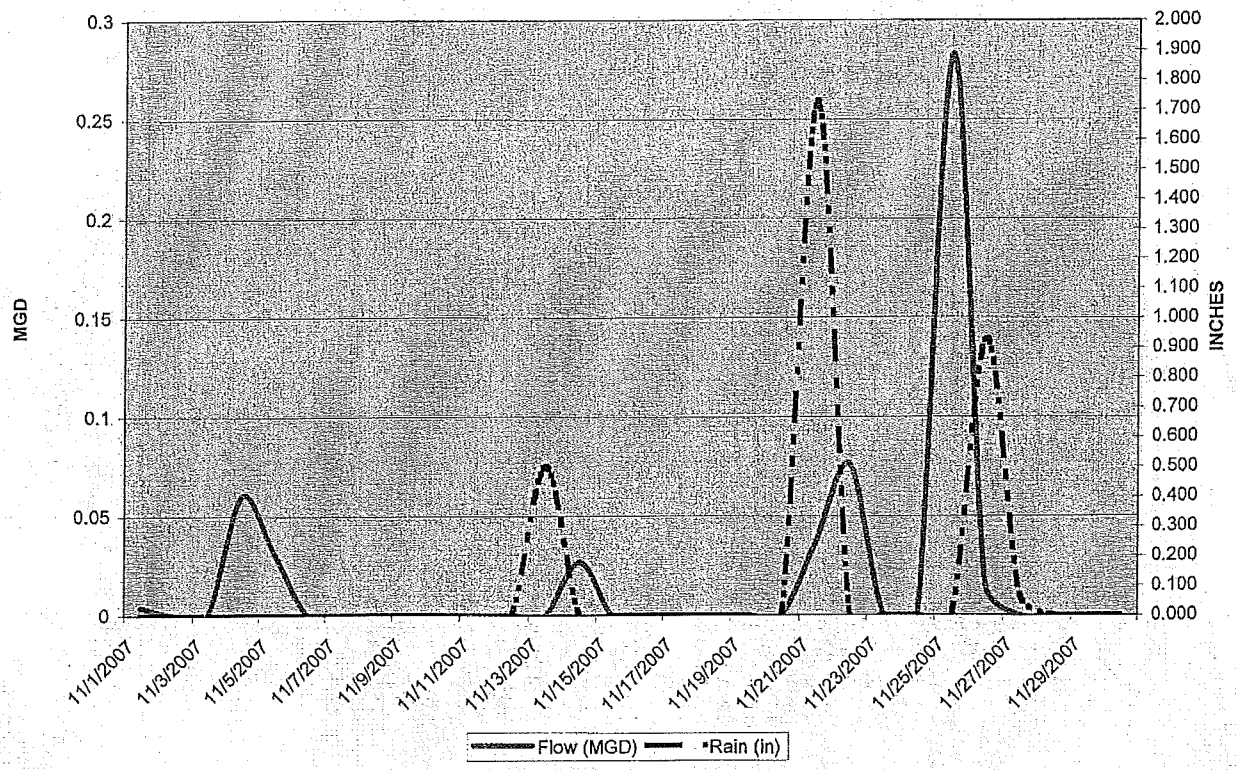


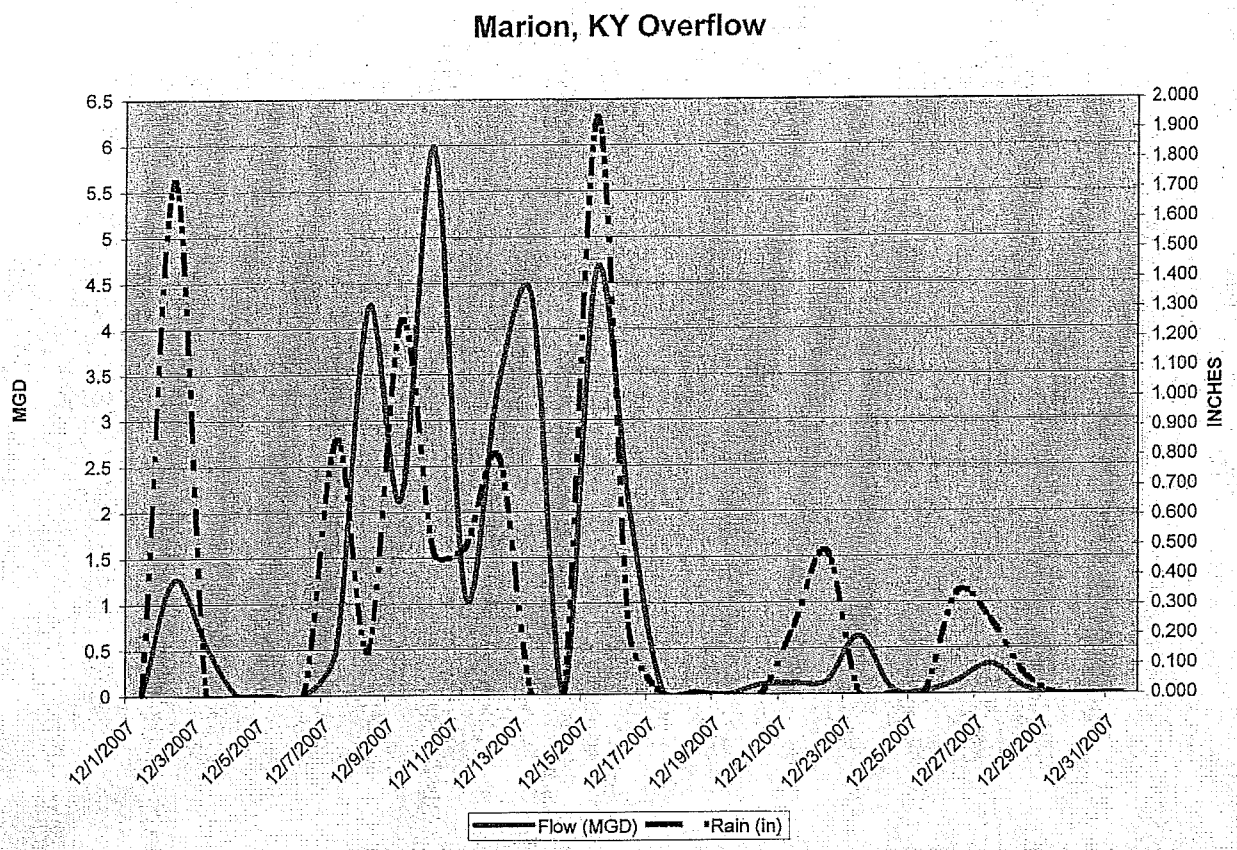
Marion, KY Overflow




Marion, KY Overflow
MGD
INCHES
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1.600
1.500
1.400
1.300
1.200
1.100
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
10/1/2007
10/3/2007
10/5/2007
10/7/2007
10/9/2007
10/11/2007
10/13/2007
10/15/2007
10/17/2007
10/19/2007
10/21/2007
10/23/2007
10/25/2007
10/27/2007
10/29/2007
10/31/2007
Flow (MGD)
Rain (in)

Marion, KY Overflow




Marion, KY Overflow
MGD
INCHES
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
2.000
1.900
1.800
1.700
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1.100
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0.900
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0.600
0.500
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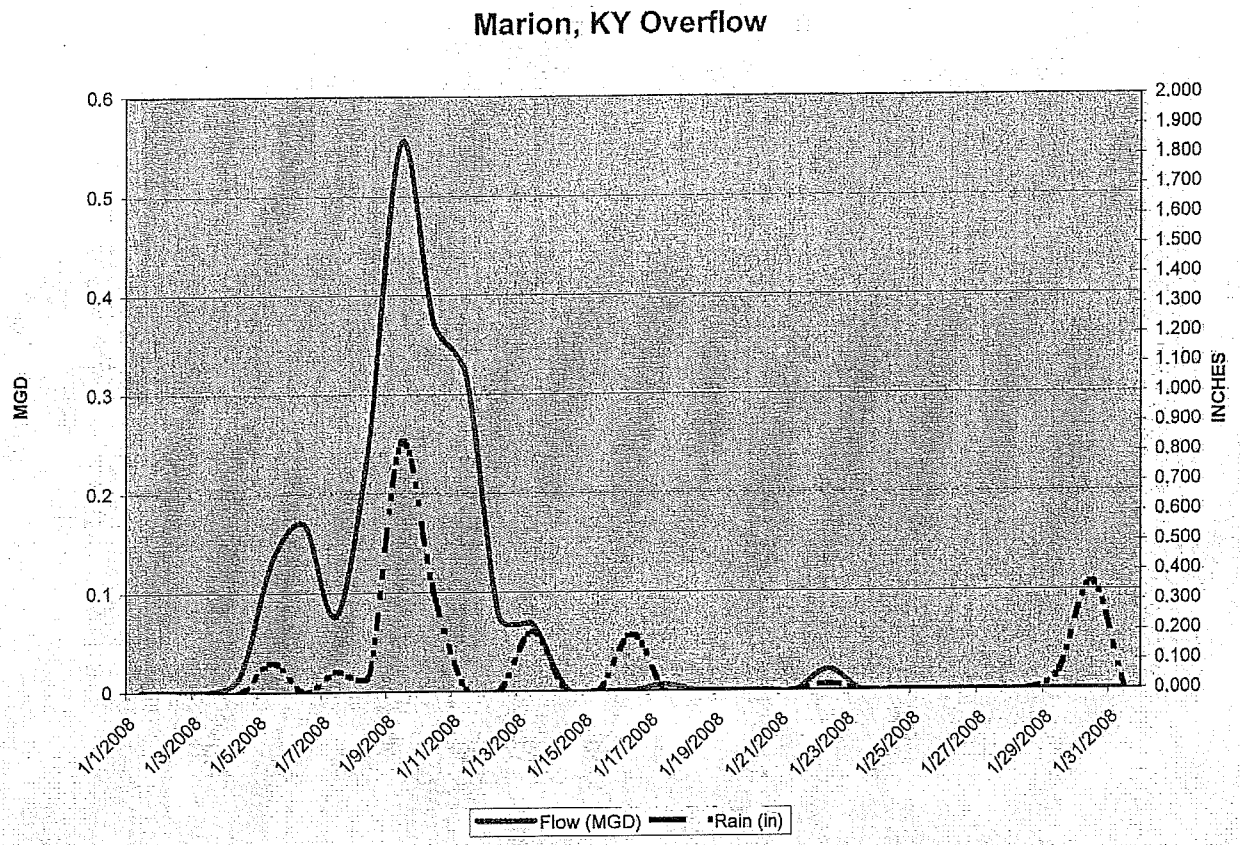
0.000
12/1/2007
12/3/2007
12/5/2007
12/7/2007
12/9/2007
12/11/2007
12/13/2007
12/15/2007
12/17/2007
12/19/2007
12/21/2007
12/23/2007
12/25/2007
12/27/2007
12/29/2007
12/31/2007
Flow (MGD)
Rain (in)


Marion, KY Overflow
MGD
INCHES
0.6
0.5
0.4
0.3
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0.1
0
2.000
1.900
1.800
1.700
1.600
1.500
1.400
1.300
1.200
1.100
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
1/1/2008
1/3/2008
1/5/2008
1/7/2008
1/9/2008
1/11/2008
1/13/2008
1/15/2008
1/17/2008
1/19/2008
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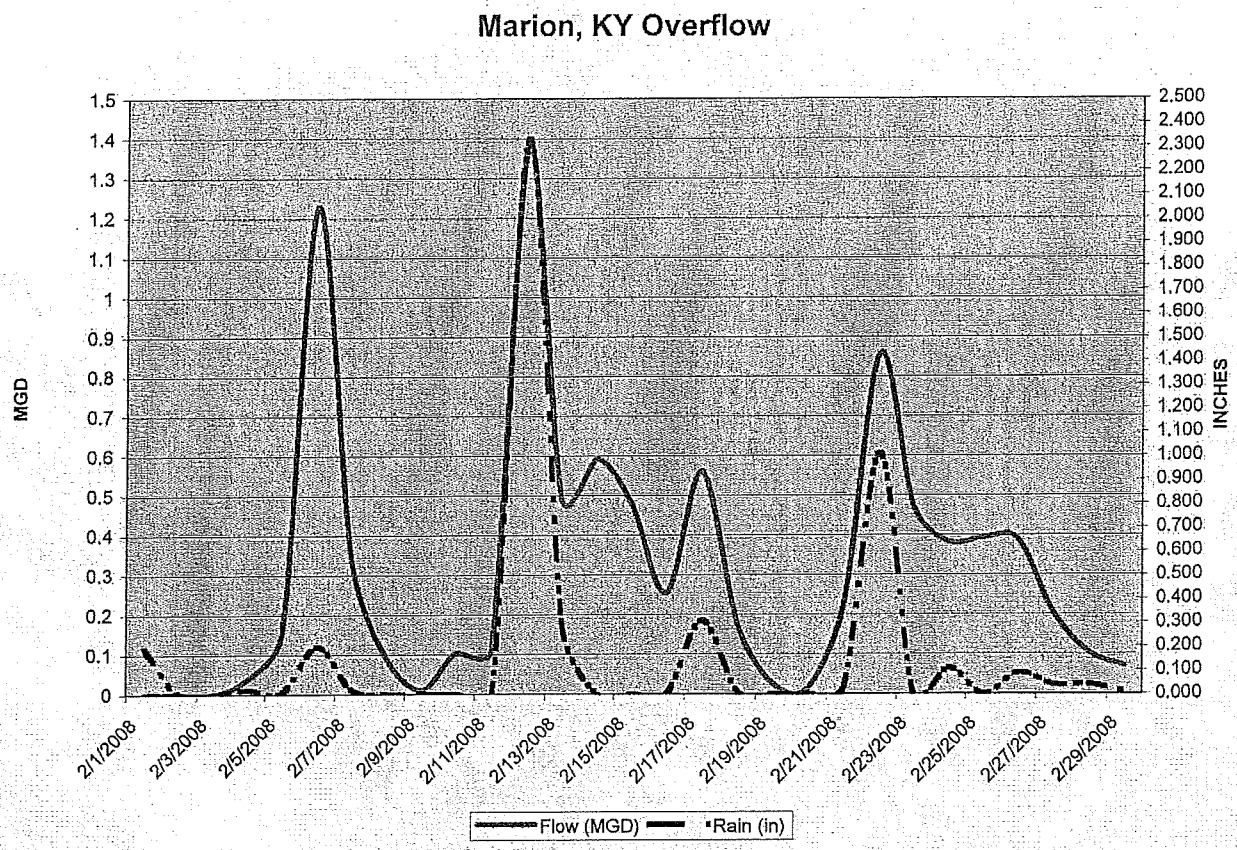
1/27/2008
1/29/2008
1/31/2008
Flow (MGD)
Rain (in)


Marion, KY Overflow
MGD
INCHES
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2.500
2.400
2.300
2.200
2.100
2.000
1.900
1.800
1.700
1.600
1.500
1.400
1.300
1.200
1.100
1.000
0.900
0.800
0.700
0.600
0.500
0.400
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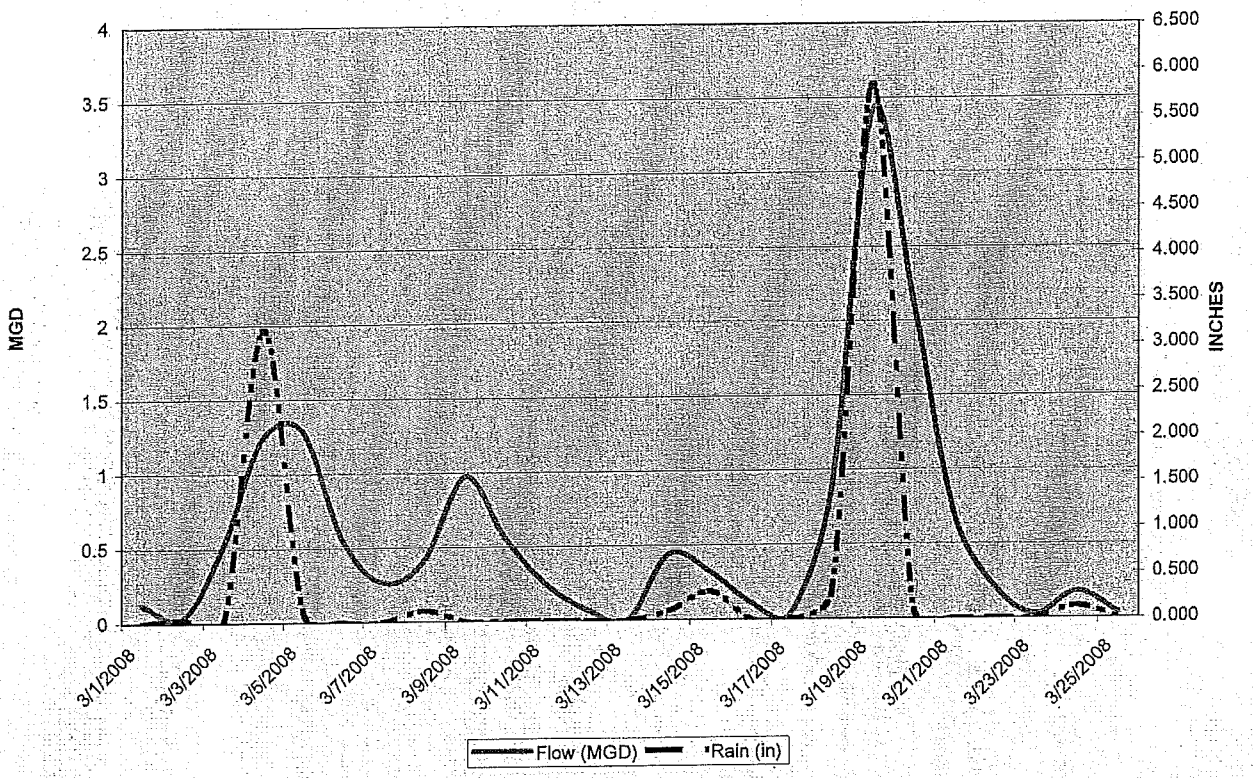
2/1/2008
2/3/2008
2/5/2008
2/7/2008
2/9/2008
2/11/2008
2/13/2008
2/15/2008
2/17/2008
2/19/2008
2/21/2008
2/23/2008
2/25/2008
2/27/2008
2/29/2008
Flow (MGD)
Rain (in)

Marion, KY Overflow



Technical Review Checklist – Pine Branch Mining, LLC 5/14/2014

Application Information:

Contact	**D. Edward Brown**
AI #	**82025**
KPDES #	**KYG041886**
DNR #	**897-0568**
Action	**AM-09**
Nearest Community	**Chavies, KY**
County	**Perry & Breathitt**

Form Reviewer: L. Dusak

Application Type

☐ - New mining operation

X - Additional area in same watershed

☐ - Additional area in different watershed

☐ - Previously covered by an individual permit (IP)

SDAA Required? (New or expanded discharge)

X - Content acceptable

X - Certification complete with appropriate signature

Mine Activities

Surface: Current 2,479.4 ac; Add 24.5 ac.

Auger: Current 120.0; New = 0

UG: Current ; New

☐ Coal preparation plant (IP)

☐ Coal dredging (IP)

☐ Slurry disposal (IP)

☐ Coal remining (IP)

☐ Anhydrous ammonia treatment (IP)

☐ Solid/special waste disposal (IP)

☐ Alkaline mine (IP)

Effluent Characteristics

X - Bench Sheet and Lab Sheets Included and Acceptable

Ponds: Total of 30 ponds.

Bench: Existing 22; New 3; NC 18; Deleted 2

Instream: Existing 8; New 0; NC 0; Deleted 1

Process Reminders:

X - Review Map in TEMPO and marked INTE

X - Outfalls entered in Application and Locked

☐ DNR "TAC" Date **(Required): Pending as of 5/14/14**

X -TRC in TEMPO and marked INTE

Public Notice Dates: 05/15 through 5/29/2014

☐ PN Not Required – no fees due / no public notice

☐ PN Not Required –fees due, but no public notice

☐ PN Required – no fees due

X - PN Required – fees due

Decision: GP Coverage Allowed

Justification: There are no impaired or protected waters directly downstream from the proposed mining.

Mine Status: A multiple seam area mine covers 2,479 surface acres with another 120 acres of augering on the lowest seam. There are 4 hollow fills, 38 ponds and 1 sediment channel permitted. This amendment proposes 3 additional outfalls from 2 new sediment channels. 4 ponds are instream, 11 are embankment ponds.

Phone Conversations		
Date	**Contact Person**	**Synopsis**

Letters		
Type	**Date Issued**	**Deficiency**

Meetings		
Date	**Attendees**	**Synopsis**

Technical Review Checklist – Pine Branch Mining, LLC 5/14/2014

Map Review X - Map Verification (Same MRP Submitted to DNR)

Basin Management Unit: Kentucky River Basin.			
Receiving Waters	**Use Classifications (305b)**	**Antideg Category (303d)**	**HUC 14**
Haddock Fork @ 0.5	WAH PCR SCR DWS	HQ	05100201000
Grapevine Creek @ 2.0	WAH PCR SCR DWS	HQ	05100201000403
Caney Creek @ 0.4	WAH PCR SCR DWS	HQ	05100201003294
Leatherwood Creek @ 3.7	WAH PCR SCR DWS	HQ	05100201000955
Right Fk Leatherwood Creek @ 0.2	WAH PCR SCR DWS	HQ	05100201000957
Little Leatherwood Creek @ 2.2	WAH PCR SCR DWS	HQ	05100201000958
Saw Branch @ 0.4	WAH PCR SCR DWS	HQ	05100201000961
Mullins Branch @ 0.1	WAH PCR SCR DWS	HQ	05100201000963
Combs Branch @ 0.3	WAH PCR SCR DWS	HQ	05100201000940
WTP: N. Fk Kentucky River @ 47.3 = Jackson Municipal Water Works. 17.5 Total Miles From Ponds to WTP			

Stream Restrictions

Stream Use Restrictions: None

☐ **Cold Water Aquatic Habitat**
Receiving Water Name: ; ☐ Direct Discharge (IP); ☐ Indirect Discharge (BPJ); Distance:

☐ **Outstanding State Resource Water**
Receiving Water Name: ; ☐ Direct Discharge (IP); ☐ Indirect Discharge (BPJ); Distance:
Associated Endangered Species:

Antidegradation Restrictions: None

☐ **Outstanding National Resource Water (SDAA)**
Receiving Water Name: ; ☐ Direct Discharge (IP); ☐ Indirect Discharge (BPJ); Distance:

☐ **Exceptional Water (SDAA)**
Receiving Water Name: ; From mile point to mile point
☐ Direct Discharge (IP); ☐ Indirect Discharge (BPJ); Distance:

☐ **Impaired Water (SDAA if not a Direct Discharge)**
Receiving Water Name: ; From mile point to mile point ; Impairments:
☐ Direct Discharge (IP); ☐ Indirect Discharge
☐ Coal-Related Impairment (sedimentation, TSS, TDS, conductivity, Fe, Mn, metals)
☐ Non-Coal Impairment

X - High Quality Water (SDAA)

Other Restrictions: None

Not within 15 miles upstream of a WTP
Public Water Supply Name: **Jackson Municipal Water Works;** Intake Water: **N. Fk KY River;** Mile Point: **47.3**

☐ **Direct Discharge to Public Lake/CAH;** Intake Water: ;

Technical Review Checklist – Pine Branch Mining, LLC 5/14/2014

Effluent Characteristics: On-site Sample? Yes; In-Stream? Yes.								
Permit No. 897-0568; Outfall/Pond No. 118 / P-44; Sample Date: 12/04/2013; Chronic Limits Apply? Yes								
Parameter	Reported Value	Units	70% of Acute		**70% of Chronic		Test Method Accepted	MDL
			mg/L	µg/L	mg/L	µg/L		
FLOW	**0.13**	**cfs**					**X**	---
Hardness	1,280.95	mg/l $CaCO_3$					X	1
Iron	0.450	mg/l	2.8		**2.45**		X	0.001 mg/l
Manganese	205.80	ug/l		2800		**1400**	X	1.8
Arsenic	< 0.5	ug/l		238		**105**	X	0.5
Cadmium*	< 0.1	ug/l		1.49		**0.19**	X	0.10
Chromium	< 5.00	ug/l		70		**70**	X	5.00
Copper*	< 5.00	ug/l		9.8		**6.53**	X	5.00
Lead*	< 2.00	ug/l		57.15		**2.23**	X	2.00
Mercury	< 5.0	ng/l		980 ng/l		**539 ng/l**	X	5.0 ng/l
Nickel*	12.75	ug/l		328.4		**36.51**	X	0.4
Selenium	< 1.00	ug/l		14		**3.5**	X	1.00
Silver*	< 0.20	ug/l		2.65			X	0.20
Zinc*	< 15.0	ug/l		83.87		**83.87**	X	15.0
Cyanide	< 3.3	ug/l		15.4		**3.64**	X	3.3
Conductivity	2,500	uS/cm					X	1

*Hardness Based Parameter. Acute and Chronic Limits developed assuming a Hardness of 100 mg/L as $CaCO_3$
**Chronic required with instream outfalls.

TABLE 1 – KPDES APPROVALS			
DNR Permit No	Action No.	Description of Action	Approval Date
897-0271	NW through AM-08	Amendment 8 adds 340.0 surface acres. Total area permitted is 2,509.4 acres (2,481.40 surface; 28.0 net auger acres).	11/23/2011
897-0271	MI-08	Revision to delete proposed outfall 117 and replace it with sediment channel SC-61 (#248). Both discharged to Saw Branch. No further KPDES action was required (NAR).	06/26/2012
897-0568	SU-01	Transfer of permit rights from Pine Branch Coal Sales, Inc. DNR # 897-0271 to Pine Branch Mining #897-0568. NAR by KPDES.	01/02/2013
897-0568	MI-09	Addresses source and treatment of high Mn in ponds BS-43 and 1HF. No changes to acreage or outfalls. NAR by KPDES.	10/21/2013
897-0568	AM-09	Amendment 9 adds 24.5 net surface acres to the Hazard #7 area mining. Total area permitted is now 2,531.90 acres (2,503.90 surface; 28.0 net auger acres). 30 outfalls are permitted.	Pending

Notes: 24.5 surface acres were added to an area mining portion of the Hazard #7 seam. 2 sediment channels are also added while 1 pond is removed. **This KPDES approval does not include the newly submitted DNR action "MI-10".**